



# Open Source Used In Cisco Virtualized Infrastructure Manager 2.0

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It was downloaded from <https://github.com/ansible/ansible.git>

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Version 2.1, February 1999

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wcwidth.js: JavaScript Portng of Markus Kuhn's wcwidth() Implementation

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// Original can be found at:

// <https://bitbucket.org/lindenlab/lld>

// Modifications by Joshua Bell [inexorabletaash@gmail.com](mailto:inexorabletaash@gmail.com)

// <https://github.com/inexorabletaash/polyfill>

// ES3/ES5 implementation of the Khronos Typed Array Specification

// Ref: <http://www.khronos.org/registry/typedarray/specs/latest/>

// Date: 2011-02-01

//

// Variations:

// \* Allows `typed_array.get/set()` as alias for subscripts (`typed_array[]`)

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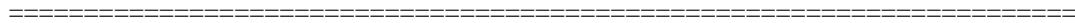
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wcwidth.js: JavaScript Porting of Markus Kuhn's wcwidth() Implementation

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// Original can be found at:

// <https://bitbucket.org/lindenlab/llsd>

// Modifications by Joshua Bell [inexorabletash@gmail.com](mailto:inexorabletash@gmail.com)

// <https://github.com/inexorabletash/polyfill>

// ES3/ES5 implementation of the Khronos Typed Array Specification

// Ref: <http://www.khronos.org/registry/typedarray/specs/latest/>

// Date: 2011-02-01

//

// Variations:

// \* Allows `typed_array.get/set()` as alias for subscripts (`typed_array[]`)

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validate-npm-package-license  
=====

Give me a string and I'll tell you if it's a valid npm package license string.

```
```javascript
var valid = require('validate-npm-package-license');
```
```

SPDX license identifiers are valid license strings:

```
```javascript
```

```
var assert = require('assert');  
var validSPDXExpression = {  
  validForNewPackages: true,  
  validForOldPackages: true,  
  spdx: true  
};
```

```
assert.deepEqual(valid('MIT'), validSPDXExpression);  
assert.deepEqual(valid('BSD-2-Clause'), validSPDXExpression);  
assert.deepEqual(valid('Apache-2.0'), validSPDXExpression);  
assert.deepEqual(valid('ISC'), validSPDXExpression);  
...  
The function will return a warning and suggestion for nearly-correct license identifiers:
```

```
```javascript
```

```
assert.deepEqual(  
  valid('Apache 2.0'),  
  {  
    validForOldPackages: false,  
    validForNewPackages: false,  
    warnings: [  
      'license should be ' +  
      'a valid SPDX license expression (without "LicenseRef"), ' +  
      "'UNLICENSED', or ' +  
      "'SEE LICENSE IN <filename>'",  
      'license is similar to the valid expression "Apache-2.0"  
    ]  
  }  
);  
...  
SPDX expressions are valid, too ...
```

```
```javascript
```

```
// Simple SPDX license expression for dual licensing  
assert.deepEqual(  
  valid('(GPL-3.0 OR BSD-2-Clause)'),  
  validSPDXExpression  
);  
...  
... except if they contain `LicenseRef`:
```

```
```javascript
```

```
var warningAboutLicenseRef = {
```



```

validForOldPackages: false,
validForNewPackages: false,
spdx: true,
warnings: [
  'license should be ' +
  'a valid SPDX license expression (without "LicenseRef")', ' +
  "'UNLICENSED', or ' +
  "'SEE LICENSE IN <filename>",
]
};

```

```

assert.deepEqual(
  valid('LicenseRef-Made-Up'),
  warningAboutLicenseRef
);

```

```

assert.deepEqual(
  valid('(MIT OR LicenseRef-Made-Up)'),
  warningAboutLicenseRef
);
```

```

If you can't describe your licensing terms with standardized SPDX identifiers, put the terms in a file in the package and point users there:

```

```javascript
assert.deepEqual(
  valid('SEE LICENSE IN LICENSE.txt'),
  {
    validForNewPackages: true,
    validForOldPackages: true,
    inFile: 'LICENSE.txt'
  }
);

```

```

assert.deepEqual(
  valid('SEE LICENSE IN license.md'),
  {
    validForNewPackages: true,
    validForOldPackages: true,
    inFile: 'license.md'
  }
);
```

```

If there aren't any licensing terms, use `UNLICENSED`:

```

```javascript

```

```
var unlicensed = {
  validForNewPackages: true,
  validForOldPackages: true,
  unlicensed: true
};
assert.deepEqual(valid('UNLICENSED'), unlicensed);
assert.deepEqual(valid('UNLICENCED'), unlicensed);
...

```

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\* \* \*

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```
````javascript
```

```
var correct = require('spdx-correct');
```

```
var assert = require('assert');
```

```
assert.equal(correct('mit'), 'MIT')
```

```
assert.equal(correct('Apache 2'), 'Apache-2.0')
```

```
assert(correct('No idea what license') === null)
```

```
````
```

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[1]: <http://eligrey.com>

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analysis/common/src/java/net/sf/snowball  
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The KStem stemmer in  
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analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,  
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,  
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt  
See <http://members.unine.ch/jacques.savoy/clef/index.html>.

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analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/fin/FinnishLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchMinimalStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/pt/PortugueseLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java  
analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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Kuromoji Japanese Morphological Analyzer - Apache Lucene Integration

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```
# -*- mode:ruby -*-
```

```
# -*- coding: utf-8 -*-
```

```
Gem::Specification.new do |s|
```

```
  s.name = 'maven-tools'
```

```
  s.version = '123'
```

```
  s.summary = 'helpers for maven related tasks'
```

```
  s.description = 'adds versions conversion from rubygems to maven and vice versa, ruby DSL for POM (Project Object Model from maven), pom generators, etc'
```

```
  s.homepage = 'http://github.com/torquebox/maven-tools'
```

```
  s.authors = ['Christian Meier']
```

```
  s.email = ['m.kristian@web.de']
```

```
  s.license = 'unknown'
```

```
end
```

```
# vim: syntax=Ruby
```

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  <meta property="og:image" content="http://www.apache.org/images/asf_logo.gif" />

  <link rel="stylesheet" type="text/css" media="screen" href="/css/style.css">
  <link rel="stylesheet" type="text/css" media="screen" href="/css/code.css">

  <script type="text/javascript" src="/js/jquery.js"></script>
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</head>
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  <div id="header" class="grid_8">
    
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    <h2>Apache License, Version 2.0</h2>
  </div>
  <div id="nav" class="grid_8">
    <ul>
      <!-- <li><a href="/" title="Welcome!">Home</a></li> -->
      <li><a href="/foundation/" title="The Foundation">Foundation</a></li>
```



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<li><a href="http://projects.apache.org" title="The Projects">Projects</a></li>
<li><a href="http://people.apache.org" title="The People">People</a></li>
<li><a href="/foundation/getinvolved.html" title="Get Involved">Get Involved</a></li>
<li><a href="/dyn/closer.cgi" title="Download">Download</a></li>
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  <input value="apache.org" name="sitesearch" type="hidden"/>
  <input type="text" name="q" id="query">
  <input type="submit" id="submit" value="Search">
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<pre> <span class="p">:::/span><span class="n">text</span>
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class="p">]</span> <span class="p">[</span><span class="n">name</span> <span class="n">of</span> <span
class="n">copyright</span> <span class="n">owner</span><span class="p">]</span>

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class="n">Apache</span> <span class="n">License</span><span class="p">,</span> <span
class="n">Version</span> <span class="p">2</span><span class="p">.</span><span class="p">0 <span class="p">(</span><span class="n">the</span>
" <span class="n">License</span> <span class="p">";</span></span>

  <span class="n">you</span> <span class="n">may</span> <span class="n">not</span> <span
class="n">use</span> <span class="n">this</span> <span class="n">file</span> <span class="n">except</span>
<span class="n">in</span> <span class="n">compliance</span> <span class="n">with</span> <span
class="n">the</span> <span class="n">License</span><span class="p">.</span></span>

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class="n">a</span> <span class="n">copy</span> <span class="n">of</span> <span class="n">the</span> <span
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class="n">License</span> <span class="n">at</span>

<span class="n">http</span><span class="p">:</span><span class="o">//</span><span class="n">www</span><span class="p">.</span><span class="n">apache</span><span class="p">.</span><span class="n">org</span><span class="o">/</span><span class="n">licenses</span><span class="o">/</span><span class="n">LICENSE</span><span class="o">-</span><span class="p">2<span class="p">.</span><span class="n">0

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<span class="n">limitations</span> <span class="n">under</span> <span class="n">the</span> <span class="n">License</span><span class="p">.</span>

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<div class="links grid\_16">

<div class="grid\_3">

<h4>Projects</h4>

<ul>

<li><a href="http://httpd.apache.org/" title="Apache Web Server (httpd)">HTTP Server</a></li>

<li><a href="http://abdera.apache.org/" title="Atom Publishing Protocol Implementation">Abdera</a></li>

<li><a href="http://accumulo.apache.org/" title="Sorted, distributed key/value store">Accumulo</a></li>

<li><a href="http://ace.apache.org/" title="Centralized life cycle management and deployment of OSGi based and related modular software artifacts for distribution.">ACE</a></li>

<li><a href="http://activemq.apache.org/" title="Distributed Messaging System">ActiveMQ</a></li>

<li><a href="http://airavata.apache.org/" title="Workflow and Computational Job Management Middleware">Airavata</a></li>

<li><a href="http://ant.apache.org/" title="Java-based build tool">Ant</a></li>

<li><a href="http://any23.apache.org/" title="Anything to Triples">Any23</a></li>

<li><a href="http://apr.apache.org/" title="Apache Portable Runtime libraries">APR</a></li>

<li><a href="http://archiva.apache.org/" title="Build Artifact Repository Manager">Archiva</a></li>

<li><a href="http://aries.apache.org/" title="Enterprise OSGi application programming model">Aries</a></li>

<li><a href="http://avro.apache.org/" title="A Serialization System">Avro</a></li>

<li><a href="http://axis.apache.org/" title="Java SOAP Engine">Axis</a></li>

- <li><a href="http://bigtop.apache.org/" title="Apache Hadoop ecosystem integration and distribution project">Bigtop</a></li>
- <li><a href="http://bloodhound.apache.org/" title="Issue tracking, wiki and repository browser">Bloodhound</a></li>
- <li><a href="http://buildr.apache.org/" title="Simple and intuitive build system for Java applications">Buildr</a></li>
- <li><a href="http://bval.apache.org/" title="Apache BVal: JSR-303 Bean Validation Implementation and Extensions">BVal</a></li>
- <li><a href="http://camel.apache.org/" title="Spring based Integration Framework which implements the Enterprise Integration Patterns">Camel</a></li>
- <li><a href="http://cassandra.apache.org/" title="Highly scalable second-generation distributed database">Cassandra</a></li>
- <li><a href="http://cayenne.apache.org/" title="User-friendly Java ORM with Tools">Cayenne</a></li>
- <li><a href="http://chemistry.apache.org/" title="CMIS (Content Management Interoperability Services) Clients and Servers">Chemistry</a></li>
- <li><a href="http://clerezza.apache.org/" title="Semantically linked data for OSGi">Clerezza</a></li>
- <li><a href="http://click.apache.org/" title="User-friendly page and component oriented web framework">Click</a></li>
- <li><a href="http://cloudstack.apache.org/" title="Infrastructure as a Service solution">CloudStack</a></li>
- <li><a href="http://cocoon.apache.org/" title="Web development framework: separation of concerns, component-based">Cocoon</a></li>
- <li><a href="http://commons.apache.org/" title="Reusable Java components">Commons</a></li>
- <li><a href="http://continuum.apache.org/" title="Continuous Integration and Build Server">Continuum</a></li>
- <li><a href="http://cordova.apache.org/" title="Platform for building native mobile applications using HTML, CSS and JavaScript">Cordova</a></li>
- <li><a href="http://couchdb.apache.org/" title="RESTful document database">CouchDB</a></li>
- <li><a href="http://creadur.apache.org/" title="Comprehension and auditing of software distributions">Creadur</a></li>
- <li><a href="http://crunch.apache.org/" title="Simple and Efficient MapReduce Pipelines">Crunch</a></li>
- <li><a href="http://ctakes.apache.org/" title="Natural language processing (NLP) tool for information extraction from electronic medical record clinical free-text">cTAKES</a></li>
- <li><a href="http://cxf.apache.org/" title="Service Framework">CXF</a></li>
- <li><a href="http://db.apache.org/" title="Database access">DB</a></li>
- <li><a href="http://deltacloud.apache.org/" title="RESTful cloud management interface">Deltacloud</a></li>
- <li><a href="http://directory.apache.org/" title="Apache Directory Server">Directory</a></li>
- <li><a href="http://empire-db.apache.org/" title="Relational Data Persistence">Empire-db</a></li>
- <li><a href="http://esme.apache.org/" title="Enterprise Social Messaging Environment">ESME</a></li>
- <li><a href="http://etch.apache.org/" title="Cross-platform, language- and transport-independent RPC-like messaging framework">Etch</a></li>
- <li><a href="http://felix.apache.org/" title="OSGi Framework and components.">Felix</a></li>
- <li><a href="http://flex.apache.org/" title="Application framework for expressive web applications that deploy to all major browsers, desktops and devices.">Flex</a></li>
- <li><a href="http://flume.apache.org/" title="A reliable service for efficiently collecting, aggregating, and moving large amounts of log data">Flume</a></li>
- <li><a href="http://forrest.apache.org/" title="Aggregated multi-channel documentation, separation of concerns">Forrest</a></li>
- <li><a href="http://geronimo.apache.org/" title="Java2, Enterprise Edition (J2EE) container">Geronimo</a></li>
- <li><a href="http://giraph.apache.org/" title="Iterative graph processing system built for high

scalability">Giraph</a></li>

<li><a href="http://gora.apache.org/" title="ORM framework for column stores such as Apache HBase and Apache Cassandra with a specific focus on Hadoop">Gora</a></li>

<li><a href="http://gump.apache.org/" title="Continuous integration of open source projects">Gump</a></li>

<li><a href="http://hadoop.apache.org/" title="Distributed computing platform">Hadoop</a></li>

<li><a href="http://hama.apache.org/" title="a Bulk Synchronous Parallel computing framework on top of Hadoop">Hama</a></li>

<li><a href="http://hbase.apache.org/" title="Hadoop Database">HBase</a></li>

<li><a href="http://hive.apache.org/" title="Data warehouse infrastructure using the Hadoop Database">Hive</a></li>

<li><a href="http://hc.apache.org/" title="Java toolset of low level HTTP components">HttpComponents</a></li>

<li><a href="http://isis.apache.org/" title="Framework for rapidly developing domain-driven apps in Java">Isis</a></li>

<li><a href="http://jackrabbit.apache.org/" title="Content Repository for Java">Jackrabbit</a></li>

<li><a href="http://james.apache.org/" title="Java Apache Mail Enterprise Server">James</a></li>

<li><a href="http://jena.apache.org/" title="Java framework for building Semantic Web applications">Jena</a></li>

<li><a href="http://jmeter.apache.org/" title="Java performance and functional testing">JMeter</a></li>

<li><a href="http://juddi.apache.org/" title="Java implementation of the Universal Description, Discovery, and Integration specification">jUDDI</a></li>

<li><a href="http://kafka.apache.org/" title="Distributed publish-subscribe messaging system">Kafka</a></li>

<li><a href="http://karaf.apache.org/" title="Server-side OSGi distribution">Karaf</a></li>

<li><a href="http://lenya.apache.org/" title="Content Management System">Lenya</a></li>

<li><a href="http://libcloud.apache.org/" title="Unified interface to the cloud">Libcloud</a></li>

<li><a href="http://logging.apache.org/" title="Cross-language logging services">Logging</a></li>

<li><a href="http://lucene.apache.org/" title="Search engine library">Lucene</a></li>

<li><a href="http://lucy.apache.org/" title="Search engine library for dynamic languages">Lucy</a></li>

<li><a href="http://mahout.apache.org/" title="Scalable machine learning library">Mahout</a></li>

<li><a href="http://manifoldcf.apache.org/" title="Framework for connecting source content repositories to target repositories or indexes.">ManifoldCF</a></li>

<li><a href="http://maven.apache.org/" title="Java project management and comprehension tools">Maven</a></li>

<li><a href="http://mina.apache.org/" title="Multipurpose Infrastructure for Network Application">MINA</a></li>

<li><a href="http://mrunit.apache.org/" title="Java library that helps developers unit test Apache Hadoop map reduce jobs">MRUnit</a></li>

<li><a href="http://myfaces.apache.org/" title="JavaServer(tm) Faces implementation and components">MyFaces</a></li>

<li><a href="http://nutch.apache.org/" title="Open Source Web Search Software">Nutch</a></li>

<li><a href="http://ode.apache.org/" title="Orchestration Director Engine: Business Process Management (BPM), Process Orchestration and Workflow through service composition.">ODE</a></li>

<li><a href="http://ofbiz.apache.org/" title="Open for Business: enterprise automation software">OFBiz</a></li>

<li><a href="http://oltu.apache.org/" title="OAuth protocol implementation in Java">Oltu</a></li>

<li><a href="http://onami.apache.org/" title="Development and maintenance of a set of Google Guice extensions">Onami</a></li>

<li><a href="http://oodt.apache.org/" title="Object Oriented Data Technology (middleware metadata)">OODT</a></li>

<li><a href="http://oozie.apache.org/" title="A workflow scheduler system to manage Apache Hadoop jobs.">Oozie</a></li>

<li><a href="http://openjpa.apache.org/" title="OpenJPA: Object Relational Mapping for Java">OpenJPA</a></li>

- <li><a href="http://openmeetings.apache.org/" title="OpenMeetings: Web-Conferencing and real-time collaboration">OpenMeetings</a></li>
- <li><a href="http://opennlp.apache.org/" title="Machine learning based toolkit for the processing of natural language text">OpenNLP</a></li>
- <li><a href="http://openoffice.apache.org/" title="An open-source, office-document productivity suite">OpenOffice</a></li>
- <li><a href="http://openwebbeans.apache.org/" title="OpenWebBeans: JSR-299 Context and Dependency Injection for Java EE Platform Implementation">OpenWebBeans</a></li>
- <li><a href="http://pdfbox.apache.org/" title="Java library for working with PDF documents">PDFBox</a></li>
- <li><a href="http://perl.apache.org/" title="Dynamic websites using Perl">Perl</a></li>
- <li><a href="http://pig.apache.org/" title="Platform for analyzing large data sets">Pig</a></li>
- <li><a href="http://pivot.apache.org/" title="Rich Internet applications in Java">Pivot</a></li>
- <li><a href="http://poi.apache.org/" title="Java API for OLE 2 Compound and OOXML Documents">POI</a></li>
- <li><a href="http://portals.apache.org/" title="Portal technology">Portals</a></li>
- <li><a href="http://qpid.apache.org/" title="Multiple language implementation of the latest Advanced Message Queuing Protocol (AMQP)">Qpid</a></li>
- <li><a href="http://rave.apache.org/" title="Web and social mashup engine">Rave</a></li>
- <li><a href="http://river.apache.org/" title="Jini service oriented architecture">River</a></li>
- <li><a href="http://roller.apache.org/" title="Java blog server">Roller</a></li>
- <li><a href="http://santuario.apache.org/" title="XML Security in Java and C++">Santuario</a></li>
- <li><a href="http://servicemix.apache.org/" title="Enterprise Service Bus">ServiceMix</a></li>
- <li><a href="http://shindig.apache.org/" title="Opensocial Reference Implementation">Shindig</a></li>
- <li><a href="http://shiro.apache.org/" title="Powerful and easy-to-use application security framework">Shiro</a></li>
- <li><a href="http://sis.apache.org/" title="Spatial Information System">SIS</a></li>
- <li><a href="http://sling.apache.org/" title="Web Framework for JCR Content Repositories">Sling</a></li>
- <li><a href="http://spamassassin.apache.org/" title="Mail filter to identify spam">SpamAssassin</a></li>
- <li><a href="http://sqoop.apache.org/" title="Bulk Data Transfer for Hadoop and Structured Datastores">Sqoop</a></li>
- <li><a href="http://stanbol.apache.org/" title="Reusable components for semantic content management">Stanbol</a></li>
- <li><a href="http://stdcxx.apache.org/" title="Apache C++ Standard Library">STDCXX</a></li>
- <li><a href="http://struts.apache.org/" title="Model 2 framework for building Java web applications">Struts</a></li>
- <li><a href="http://subversion.apache.org/" title="Version Control">Subversion</a></li>
- <li><a href="http://synapse.apache.org/" title="Enterprise Service Bus and Mediation Framework">Synapse</a></li>
- <li><a href="http://syncope.apache.org/" title="Managing digital identities in enterprise environments">Syncope</a></li>
- <li><a href="http://tapestry.apache.org/" title="Component-based Java Web Application Framework">Tapestry</a></li>
- <li><a href="http://tcl.apache.org/" title="Dynamic websites using TCL">Tcl</a></li>
- <li><a href="http://thrift.apache.org/" title="Framework for scalable cross-language services development">Thrift</a></li>
- <li><a href="http://tika.apache.org/" title="Content Analysis and Detection Toolkit">Tika</a></li>
- <li><a href="http://tiles.apache.org/" title="A templating framework for web application user interfaces">Tiles</a></li>
- <li><a href="http://tomcat.apache.org/" title="A Java Servlet and JSP Container">Tomcat</a></li>



- <li><a href="http://tomee.apache.org/" title="Java EE Web Profile built on Tomcat">TomEE</a></li>
- <li><a href="http://trafficserver.apache.org/" title="A fast, scalable and extensible HTTP/1.1 compliant caching proxy server">Traffic Server</a></li>
- <li><a href="http://turbine.apache.org/" title="A Java Servlet Web Application Framework and associated component library">Turbine</a></li>
- <li><a href="http://tuscany.apache.org/" title="An SCA based Service Composition Framework">Tuscany</a></li>
- <li><a href="http://uima.apache.org/" title="Framework and annotators for unstructured information analysis">UIMA</a></li>
- <li><a href="http://vcl.apache.org/" title="Virtual Computing Lab">VCL</a></li>
- <li><a href="http://velocity.apache.org/" title="A Java Templating Engine">Velocity</a></li>
- <li><a href="http://ws.apache.org/">Web Services</a></li>
- <li><a href="http://whirr.apache.org/" title="Libraries for running Cloud Services">Whirr</a></li>
- <li><a href="http://wicket.apache.org/" title="Component-based Java Web Application Framework.">Wicket</a></li>
- <li><a href="http://wink.apache.org/" title="RESTful Web services Framework">Wink</a></li>
- <li><a href="http://wookie.apache.org/" title="Widgets for Applications">Wookie</a></li>
- <li><a href="http://xalan.apache.org/" title="XSLT processors in Java and C++">Xalan</a></li>
- <li><a href="http://xerces.apache.org/" title="XML parsers in Java, C++ and Perl">Xerces</a></li>
- <li><a href="http://xmlbeans.apache.org/" title="XML-Java binding tool">XMLBeans</a></li>
- <li><a href="http://xmlgraphics.apache.org/" title="Conversion from XML to graphical output">XML Graphics</a></li>
- <li><a href="http://zookeeper.apache.org/" title="Centralized service for maintaining configuration information">ZooKeeper</a></li>

</ul>

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<div class="grid\_3">

<h4>Foundation</h4>

<ul>

<li><a href="/foundation/faq.html">FAQ</a></li>

<li><a href="/licenses/" title="Overview of the Apache Licenses">Licenses</a></li>

<li><a href="/foundation/marks/" title="Apache marks policies and listing">Trademarks</a></li>

<li><a href="/foundation/news.html" title="Official news feed of Foundation announcements">News</a></li>

<li><a href="/press/" title="Press, Media, and Analyst contact">Press Inquiries</a></li>

<li><a href="/foundation/records/" title="Formal corporate records and board meeting minutes">Public Records</a></li>

<li><a href="/foundation/maillinglists.html" title="Mailing lists and Apache">Mailing Lists</a></li>

<li><a href="/foundation/sponsorship.html" title="Sponsor the Foundation">Sponsorship</a></li>

<li><a href="/foundation/contributing.html" title="Donate to the Foundation">Donations</a></li>

<li><a href="/foundation/buy\_stuff.html" title="Buy Apache branded merchandise">Buy Stuff</a></li>

<li><a href="/foundation/thanks.html" title="Thank you to our Sponsors">Thanks</a></li>

<li><a href="/foundation/contact.html" title="Contact Us">Contact</a></li>

</ul>

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<h4>Foundation Projects</h4>

<ul>

<li><a href="http://attic.apache.org/" title="Inactive projects repository">Attic</a></li>

- [Conferences](/foundation/conferences.html "Meetings of developers and users")
- [Community Development](http://community.apache.org/ "Helping newcomers to the ASF")
- [Incubator](http://incubator.apache.org/ "Shepherd for new projects")
- [Infrastructure](/dev/ "ASF Infrastructure: Operations and howto documents for PMCs and contributors")
- [Labs](http://labs.apache.org/ "The Innovation Laboratories of the Apache Software Foundation")
- [Legal Affairs](/legal/ "Legal Affairs")
- [Public Relations](/press/ "Public Relations")
- [Security](/security/ "Security")
- [Travel Assistance](/travel/ "Travel Assistance")

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`<h4>Community</h4>`

`<ul>`

- [People](http://people.apache.org/ "Apache committer homepages")
- [Memorials](/memorials/ "In memoriam of past committers")
- [Feathercast](http://feathercast.org/ "Apache Podcasts")
- [Project Blogs](http://blogs.apache.org/ "Apache Project Blogs")
- [PlanetApache](http://planet.apache.org/committers/ "Apache Committers' Blogs")

`</ul>`

`</div>`

`<div class="grid_3">`

`<h4>How It Works</h4>`

`<ul>`

- [Introduction](/foundation/how-it-works.html)
- [Meritocracy](/foundation/how-it-works.html#meritocracy)
- [Structure](/foundation/how-it-works.html#structure)
- [Roles](/foundation/how-it-works.html#roles)
- [Collaboration](/foundation/how-it-works.html#management)
- [Incubator](/foundation/how-it-works.html#incubator)
- [Other entities](/foundation/how-it-works.html#other)
- [Glossary](/foundation/glossary.html)
- [Voting](/foundation/voting.html)

`</ul>`

`</div>`

`</div>`

`<div class="clear"></div>`

`</div>`

`<div id="copyright" class="container_16">`

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</div>  
</body>  
</html>

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- \* Jonathan Van Eenwyk (jdve)
- \* Jordan Sissel (jordansissel)
- \* Joo Duarte (jsvd)
- \* Mathieu MILLET (htam-net)
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- \* James Turnbull (jamtur01)
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML+RDFa 1.0//EN"
"http://www.w3.org/MarkUp/DTD/xhtml-rdfa-1.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" version="XHTML+RDFa 1.0" dir="ltr">

<head profile="http://www.w3.org/1999/xhtml/vocab">
  <meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
  <link rel="shortcut icon" href="http://opensource.org/files/garland_favicon.png" type="image/png" />
  <link rel="shortlink" href="/node/66" />
  <link rel="canonical" href="/licenses/MIT" />
  <meta name="Generator" content="Drupal 7 (http://drupal.org)" />
  <title>The MIT License (MIT) | Open Source Initiative</title>
  <link type="text/css" rel="stylesheet"
href="http://opensource.org/files/css/css_pbm0lsQQJ7A7WCCIMgxLho6mL_kBNgznuUWmTWcnfoE.css"
media="all" />
  <link type="text/css" rel="stylesheet"
href="http://opensource.org/files/css/css_Frms3lIkKCDMuuCHUzEHGgSAc59B2At_Y3KWbmFS9k4.css"
media="all" />
  <link type="text/css" rel="stylesheet" href="http://opensource.org/files/css/css_2wI77kyP-
rJKVpFW5M3KFcj7Cb99lZalmubKIwWwsmU.css" media="all" />
  <link type="text/css" rel="stylesheet"
href="http://opensource.org/files/css/css_k3snrbsthqot7V7ccRZHS9OkCZkwBv4adtNieIVlbeU.css" media="print"
/>

  <!--[if lt IE 7]>
  <link type="text/css" rel="stylesheet" href="http://opensource.org/themes/garland/fix-ie.css?mp63bk" media="all"
/>
  <![endif]-->
  <script type="text/javascript"
src="http://opensource.org/files/js/js_xAPI0qIk9eowy_iS9tNkCWXLUVoat94SQT48UBCFkyQ.js"></script>
  <script type="text/javascript">
  <!--/--><![CDATA[//><!--
  jQuery.extend(Drupal.settings,
  {"basePath":"/","pathPrefix":"","ajaxPageState":{"theme":"garland","theme_token":"4fpo5qSBy3ypLVGvf9l0NS5
```

```

zicZpC5CdOisdhg6HN0A", "js": {"misc/jquery.js":1, "misc/jquery.once.js":1, "misc/drupal.js":1}, "css": {"modules/
system/system.base.css":1, "modules/system/system.menus.css":1, "modules/system/system.messages.css":1, "mo
dules/system/system.theme.css":1, "modules/aggregator/aggregator.css":1, "modules/comment/comment.css":1, "
modules/field/theme/field.css":1, "sites/all/modules/mollom/mollom.css":1, "modules/node/node.css":1, "modul
es/search/search.css":1, "modules/user/user.css":1, "themes/garland/style.css":1, "themes/garland/print.css":1, "th
emes/garland/fix-ie.css":1}}});
//--><![]]>
</script>
</head>
<body class="html not-front not-logged-in one-sidebar sidebar-first page-node page-node- page-node-66 node-type-
page fluid-width" >
<div id="skip-link">
  <a href="#main-content" class="element-invisible element-focusable">Skip to main content</a>
</div>

<div id="wrapper">
  <div id="container" class="clearfix">

    <div id="header">
      <div id="logo-floater">
        <div id="branding"><strong><a href="/">
          
          <span>Open Source Initiative</span>      </a></strong></div>
        </div>

      </div> <!-- /#header -->

      <div id="sidebar-first" class="sidebar">
        <div class="region region-sidebar-first">
          <div id="block-search-form" class="block block-search clearfix">

            <h2 class="title">Search this site:</h2>

            <div class="content">
              <form action="/licenses/mit-license.php" method="post" id="search-block-form" accept-charset="UTF-
8"><div><div class="container-inline">
                <div class="form-item form-type-textfield form-item-search-block-form">
                  <label class="element-invisible" for="edit-search-block-form--2">Search </label>
                  <input title="Enter the terms you wish to search for." type="text" id="edit-search-block-form--2"
name="search_block_form" value="" size="15" maxlength="128" class="form-text" />
                </div>
                <div class="form-actions form-wrapper" id="edit-actions"><input type="submit" id="edit-submit" name="op"
value="Search" class="form-submit" /></div><input type="hidden" name="form_build_id" value="form-
4EDtVxw46gSEo_8WSrM0P9LQR3dUkooc9ICfQWgbwM" />
                <input type="hidden" name="form_id" value="search_block_form" />
              </div>
            </div></form> </div>

```



```

</div>
<div id="block-system-navigation" class="block block-system block-menu clearfix">

  <h2 class="title">Navigation</h2>

  <div class="content">
    <ul class="menu"><li class="first collapsed"><a href="/about" title="About the Open Source Initiative">About
the OSI</a></li>
<li class="collapsed"><a href="/osd" title="The actual OSD defining what constitutes an Open Source licence">The
Open Source Definition</a></li>
<li class="collapsed"><a href="/licenses">Open Source Licenses</a></li>
<li class="collapsed"><a href="/trademark" title="Information about trademark and logo usage">Trademark and
Logo Usage</a></li>
<li class="leaf"><a href="/faq" title="Frequently Asked Questions about open source and about the
OSI.">FAQ</a></li>
<li class="collapsed"><a href="/osr-intro" title="Open Standards Requirement for Software">Open
Standards</a></li>
<li class="leaf"><a href="/osi-open-source-education" title="OSI's Open Source Education Initiative and
Activities">Open Source Education</a></li>
<li class="collapsed"><a href="/lists" title="The virtual committees where the OSI's work gets
done">Mailing lists</a></li>
<li class="collapsed"><a href="/help" title="Resources for questions and further exploration">Getting
Help</a></li>
<li class="collapsed"><a href="http://opensource.org/donate" title="">Donate to the OSI</a></li>
<li class="leaf"><a href="/members">OSI Individual Membership</a></li>
<li class="collapsed"><a href="/affiliates" title="Home page for OSI's membership scheme for non-profits
and not-for-profits">OSI Affiliate Membership</a></li>
<li class="leaf"><a href="/contact" title="">Contact OSI</a></li>
<li class="last leaf"><a href="/ToS" title="Rules for posting content on this site">Terms of Service</a></li>
</ul> </div>
</div>
</div>
  </div>

  <div id="center"><div id="squeeze"><div class="right-corner"><div class="left-corner">
    <h2 class="element-invisible">You are here</h2><div class="breadcrumb"><a href="/">Home</a></div>
    <a id="main-content"></a>
    <div id="tabs-wrapper" class="clearfix">
      <h1 class="with-tabs">The MIT License
(MIT)</h1>
      </div>
      <div class="clearfix">
        <div class="region region-content">
          <div id="block-system-main" class="block block-system clearfix">

            <div class="content">
              <div id="node-66" class="node node-page">

```

```

<div class="content clearfix">
  
  <div class="field field-name-body field-type-text-with-summary field-label-hidden"><div class="field-
items"><div class="field-item even"><p>The MIT License (MIT)</p>
<p>Copyright (c) <year> <copyright holders></p>
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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,<br />
OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN<br />
THE SOFTWARE.</p>
</div></div></div> </div>

<div class="clearfix">
  <div class="links"></div>

</div>

</div>
</div>
</div>
</div>
  </div>
  <div class="region region-footer">
    <div id="block-block-11" class="block block-block clearfix">

<div class="content">
  <!-- Creative Commons License --><a rel="license" href="http://creativecommons.org/licenses/by/3.0/"></a><br />Opensource.org site content is licensed under a <a rel="license"
href="http://creativecommons.org/licenses/by/3.0/">Creative Commons Attribution 3.0 License</a>.<!-- /Creative
Commons License -->

<!-- <rdf:RDF xmlns="http://web.resource.org/cc/" xmlns:dc="http://purl.org/dc/elements/1.1/"

```

```
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
  <Work rdf:about="">
    <license rdf:resource="http://creativecommons.org/licenses/by/3.0/" />
  </Work>
  <License rdf:about="http://creativecommons.org/licenses/by/3.0/"><permits
rdf:resource="http://web.resource.org/cc/Reproduction"/><permits
rdf:resource="http://web.resource.org/cc/Distribution"/><requires
rdf:resource="http://web.resource.org/cc/Notice"/><requires
rdf:resource="http://web.resource.org/cc/Attribution"/><permits
rdf:resource="http://web.resource.org/cc/DerivativeWorks"/></License></rdf:RDF>
-->
```

```
| <a href=" ../ToS">Terms of Service</a>
```

```
</div>
```

```
</div>
```

```
<div id="block-block-7" class="block block-block clearfix">
```

```
<div class="content">
```

```
<script src="http://www.google-analytics.com/urchin.js" type="text/javascript">
```

```
<!--/--><![CDATA[// ><!--
```

```
//--><![>
```

```
</script><script type="text/javascript">
```

```
<!--/--><![CDATA[// ><!--
```

```
_uacct = "UA-3916956-1";
```

```
urchinTracker();
```

```
//--><![>
```

```
</script> </div>
```

```
</div>
```

```
</div>
```

```
</div></div></div></div> <!-- /.left-corner, /.right-corner, /#squeeze, /#center -->
```

```
</div> <!-- /#container -->
```

```
</div> <!-- /#wrapper -->
```

```
</body>
```

```
</html>
```

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- \* Jordan Sissel (jordansissel)
- \* Kurt Hurtado (kurtado)
- \* Marcus Vinicius Ferreira (mv)
- \* Nick Ethier (nickethier)
- \* Nikolay Bryskin (nikicat)
- \* Pete Fritchman (fetep)
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- \* ronnocol

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# Jackson JSON processor

Jackson is a high-performance, Free/Open Source JSON processing library. It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has been in development since 2007.

It is currently developed by a community of developers, as well as supported commercially by FasterXML.com.

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# 1.18 meld3 0.6.10

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Contributors

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- Chris McDonough, 2005-12-18

- Tres Seaver, 2006-02-09

- Jorge Puente Sarrn, 2012-11-27

# 1.19 my\_init 1.0

## 1.19.1 Available under license :

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# 1.20 nuttcp 7.3.3

## 1.20.1 Available under license :

```
/*
 * NUTTCP.C          v7.3.3
 *
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 * Copyright(c) 2003 - 2015 Rob Scott. All rights reserved.
 *
 * nuttcp is free, opensource software. You can redistribute it and/or
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 * A copy of the license can also be found in the LICENSE file.
 *
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 * for more details.
 *
 * Based on nttcp
 * Developed by Bill Fink, billfink@mindspring.com
 * and Rob Scott, rob@hpcmo.hpc.mil
 * Latest version available at:
 * http://lcp.nrl.navy.mil/nuttcp/
 *
```

- \* Test TCP connection. Makes a connection on port 5000(ctl)/5101(data)
- \* and transfers fabricated buffers or data copied from stdin.
- \*
- \* Run nuttcp with no arguments to get a usage statement
- \*
- \* Modified for operation under 4.2BSD, 18 Dec 84
- \* T.C. Slattery, USNA
- \* Minor improvements, Mike Muuss and Terry Slattery, 16-Oct-85.
- \*
- \* 7.3.3, Rob Scott, 1-May-15
- \* Fix tos to work for ipv6 by setting traffic class
- \* 7.3.2, Bill Fink, 3-Aug-14
- \* Allow longer server info timeout for third party via --idle-data-timeout
- \* 7.3.1, Bill Fink, 27-Jul-14
- \* Added feature to specify source port with "-p#:#" and "-P#:#"
- \* Updated Copyright notice for new year
- \* 7.2.2, Bill Fink, 25-May-13
- \* Fix Linux bug of exceeding MAX\_EOT\_WAIT\_SEC on lossy large RTT path
- \* with large window causing false "Error: receiver not ACKing data"
- \* Change Linux method for draining socket send queue at EOT while waiting
- \* for any TCP retransmissions to complete - instead of checking
- \* tcp\_i\_unacked value from TCP\_INFO getsockopt() use SIOCOUTQ ioctl()
- \* (new error message is "Error: timeout while draining socket send queue")
- \* 7.2.1, Bill Fink, 26-Dec-12
- \* Add "-g" option to specify multicast IP address to use
- \* Clean up really confused transmit code for IPv4/IPv6 SSM multicast
- \* Bug fix from Aristeu Rozanski:
- \* Crash caused by closing TCP\_ADV\_WIN\_SCALE file even if open failed
- \* 7.1.6, Bill Fink, 25-Feb-12
- \* Add "-sd" direct I/O option for non-sinkmode (Linux only)
- \* Fix bug with server CPU affinity being parsed as %X instead of %d
- \* For non-sinkmode insure complete network block is written to stdout
- \* Above fixes nuttcp bug seen with --copy-dir getting premature EOF
- \* Updated Copyright notice for new year
- \* Whitespace style cleanups
- \* 7.1.5, Rob Scott, 19-Jul-11
- \* Not every system has ERESTART added in 7.1.4, wrapped in ifdef
- \* 7.1.4, Bill Fink, 30-May-11
- \* Updated Copyright notice
- \* Use -DHAVE\_SS\_FAMILY to override \_AIX workaround for newer AIX
- \* AIX can get ERESTART rather than EINTR/EAGAIN error on interrupted I/O
- \* Fix non-Linux systems to properly count TCP retrans for multiple streams
- \* Allow xinetd nuttcp server to handle both IPv4 & IPv6 if no explicitaf
- \* Detect EOD for non-sinkmode UDP transfers
- \* Suppress bogus warning when using maximum size UDP packet
- \* 7.1.3, Bill Fink, 1-Apr-10
- \* Fix compiler warnings generated by Ubuntu 9.x gcc 4.3.x/4.4.x versions
- \* (to see warnings compile with -DWANT\_WUR)

- \* 7.1.2, Bill Fink, 23-Jan-10
- \* Updated Copyright notice
- \* Terminate non-sinkmode after specified file size with "-n" option
- \* Allow multilink aggregation with "-N##m" option to work for receive
- \* Add "-sz" zero copy option for non-sinkmode when input is a regular file
- \* Fix compiler warnings about strict-aliasing rules for variable group
- \* Remove "-Sf" forced server mode from Usage: statement
- \* Fix zeroing of clientaddr6 during server cleanup
- \* Fix freeaddrinfo() processing during cleanup
- \* Change manually started oneshot server to have parent process just exit
- \* Some minor whitespace cleanup
- \* 7.1.1, Bill Fink, 24-Dec-09
- \* Provide summary TCP retrans info for multi-stream TCP
- \* Fix bug with retrans interval info when -fparse
- \* Add "+stride" or "+n.n.n.n" syntax for multi-stream TCP (IPv4)
- \* Fix third party bug with "-xc" option adding extraneous 't' character
- \* Add optional client-side name resolution for third party host
- \* Add "-N##m" option for multilink aggregation for multiple streams
- \* Add "-xc##/" and "-P##/" options to Usage: statement
- \* Some minor whitespace cleanup
- \* 7.0.1, Bill Fink, 18-Sep-09
- \* Enable jitter measurements with "-j" option
- \* Enable one-way delay measurements with "-o" option
- \* Fix bug with RTT and -fparse
- \* 6.2.10, Bill Fink, 1-Aug-09
- \* Change ctl/data port checks to < 1024 instead of < 5000
- \* Fix "--idle-data-timeout" Usage: statement for new default minimum
- \* Improve transmit performance with "-i" by setting poll() timeout to 0
- \* Remove commented out code for unused normal\_eod
- \* Don't output interval retrans info if non-sinkmode (for nuttscp)
- \* 6.2.9, Bill Fink, 24-Jun-09
- \* Make retrans info reporting work again on newer Linux distros
- \* Skip check for unACKed data at end of transfer if -DBROKEN\_UNACKED
- \* 6.2.8, Bill Fink, 8-Jun-09
- \* Play nice with iperf (change default data port to 5101)
- \* Delay sending of server "OK" until after successful server bind()
- \* Client check for server errors before starting data transfer
- \* Continue checking for server output while draining client transmission
- \* Correct "server not ACKing data" error message (server -> receiver)
- \* Add "--packet-burst" option for Rob
- \* Fix "--idle-data-timeout" Usage: statement for client
- \* Improve accuracy of retrans info timing synchronization (client xmitter)
- \* Change reference to nuttcp repository from ftp:// to http://
- \* Fix bug affecting nuttscp introduced in 6.2.4 (not honoring oneshot)
- \* Whitespace cleanup: get rid of <tab><spaces><tab>, <tab>\$, & <spaces>\$
- \* Whitespace cleanup: convert 8 spaces to <tab> where appropriate
- \* 6.2.7, Bill Fink, 22-May-09
- \* Allow rate limit to be exceeded temporarily by n packets ("-Rixxx/n")



- \* Fix several reqval parameter settings
- \* 6.2.6, Bill Fink, 17-Apr-09
- \* Allow setting server CPU affinity from client via "-xcs" option
- \* Allow setting client & server CPU affinity via third party
- \* Fix bug with option processing when reqval is set
- \* 6.2.5, Bill Fink, 16-Apr-09
- \* Allow passing of third party control port via "-Pctlport/ctlport3"
- \* Up default idle data minimum to 15 sec to better handle net transients
- \* Don't reset nstream until after last use (fix getaddrinfo() memory leak)
- \* 6.2.4, Bill Fink, 10-Apr-09
- \* Fix bug with simultaneous server connections to manually started server
- \* 6.2.3, Bill Fink, 5-Apr-09
- \* Add "-xc" option to set CPU affinity (Linux only)
- \* Fix Usage: statement: "--idle-data-timeout" both server & client option
- \* Don't reset priority on server cleanup
- \* Fix priority output for "-fparse"
- \* 6.2.2, Bill Fink, 3-Apr-09
- \* Fix bad third party bug causing >= 1 minute transfers to silently fail
- \* Fix Usage: statement: "--idle-data-timeout" not just a server option
- \* 6.2.1, Rob Scott, 22-Mar-09
- \* Added IPv6 and SSM MC support
- \* Ported from Rob's 5.5.5 based code by Bill Fink
- \* 6.1.5, Bill Fink, 5-Mar-09
- \* Fix client lockup with third party when network problem (for scripts)
- \* 6.1.4, Bill Fink, 5-Jan-09
- \* Updated Copyright notice
- \* Bugfix: set chk\_idle\_data on client (now also checks no data received)
- \* Use argv[0] instead of "nuttcp" for third party
- \* Bugfix: give error message again on error starting server
- \* 6.1.3, Bill Fink, 17-Sep-08
- \* Timeout client accept() too and give nice error message (for scripts)
- \* 6.1.2, Bill Fink, 29-Aug-08
- \* Don't wait forever for unacked data at EOT (limit to 1 minute max)
- \* Extend no data received protection to client too (for scripts)
- \* Give nice error messages to client for above cases
- \* Don't hang getting server info if server exited (timeout reads)
- \* 6.1.1, Bill Fink, 26-Aug-08
- \* Remove beta designation
- \* Report RTT by default (use "-f-rtt" to suppress)
- \* Moved RTT info to "connect to" line
- \* Correct bogus IP frag warning for e.g. "-11472" or "-18972"
- \* Don't report interval host-retrans if no data rcvd (e.g. initial PMTU)
- \* Correct reporting of retrans info with "-fparse" option
- \* Correct reporting of RTT with "-F" flip option
- \* Report doubled send and receive window sizes (for Linux)
- \* Add report of available send and receive window sizes (for Linux)
- \* Touchup TODO list to remove some already completed items
- \* 6.0.7, Bill Fink, 19-Aug-08

- \* Add delay (default 0.5 sec) to "-a" option & change max retries to 10
- \* Updated Copyright notice
- \* 6.0.6, Bill Fink, 11-Aug-08
- \* Delay server forking until after listen() for better error status
- \* Above suggested by Hans Blom (jblom@science.uva.nl)
- \* Make forced server mode the default behavior
- \* Check address family on getpeername() so "ssh host nuttcp -S" works
- \* Add setsid() call for manually started server to create new session
- \* Some minor code cleanup
- \* 6.0.5, Bill Fink, 10-Aug-08
- \* Allow "-s" from/to stdin/stdout with "-l" oneshot server mode
- \* Switch beta vers message to stderr to not interfere with "-s" option
- \* Don't set default timeout if "-s" specified
- \* Give error message for "-s" with "-S" (xinetd or manually started)
- \* 6.0.4, Bill Fink, 18-Jul-08
- \* Forgot about 3rd party support for RTT info - fix that
- \* 6.0.3, Bill Fink, 17-Jul-08
- \* A better (and accurate) way to get RTT info (and not just Linux)
- \* 6.0.2, Bill Fink, 16-Jul-08
- \* Add RTT info to brief output for Linux
- \* 6.0.1, Bill Fink, 17-Dec-07
- \* Add reporting of TCP retransmissions (interval reports on Linux TX only)
- \* Add reporting of data transfer RTT for verbose Linux output
- \* Add beta version messages and "-f-beta" option to suppress
- \* Automatically switch "classic" mode to oneshot server mode
- \* Fix UDP loss info bug not updating stream\_idx when not need\_swap
- \* Fix compiler warning doing sprintf of timeout
- \* Correct comment on NODROPS define
- \* 5.5.5, Bill Fink, 1-Feb-07
- \* Change default MC addr to be based on client addr instead of xmit addr
- \* 5.5.4, Bill Fink, 3-Nov-06
- \* Fix bug with negative loss causing huge drop counts on interval reports
- \* Updated Copyright notice and added GPL license notice
- \* 5.5.3, Bill Fink, 23-Oct-06
- \* Fix bug with "-Ri" instantaneous rate limiting not working properly
- \* 5.5.2, Bill Fink, 25-Jul-06
- \* Make manually started server multi-threaded
- \* Add "--single-threaded" server option to restore old behavior
- \* Add "-a" client option to retry a failed server connection "again"
- \* (for certain possibly transient errors)
- \* 5.5.1, Bill Fink, 22-Jul-06
- \* Fix bugs with nbuf\_bytes and rate\_pps used with 3rd party
- \* Pass "-D" option to server (and also make work for third party)
- \* Allow setting precedence with "-c##p"
- \* 5.4.3, Rob Scott & Bill Fink, 17-Jul-06
- \* Fix bug with buflen passed to server when no buflen option specified
- \* (revert 5.3.2: Fix bug with default UDP buflen for 3rd party)
- \* Better way to fix bug with default UDP buflen for 3rd party

- \* Trim trailing '\n' character from err() calls
- \* Use fcntl() to set O\_NONBLOCK instead of MSG\_DONTWAIT to send() ABORT
- \* (and remove MSG\_DONTWAIT from recv() because it's not needed)
- \* Don't re-initialize buflen at completion of server processing
- \* (non inetd: is needed to check for buffer memory allocation change,
- \* caused bug if smaller "-l" followed by larger default "-l")
- \* 5.4.2, Bill Fink, 1-Jul-06
- \* Fix bug with interrupted UDP receive reporting negative packet loss
- \* Make sure errors (or debug) from server are propagated to the client
- \* Make setsockopt SO\_SNDBUF/SO\_RCVBUF error not be fatal to server
- \* Don't send stderr to client if nofork is set (manually started server)
- \* 5.4.1, Bill Fink, 30-Jun-06
- \* Fix bug with UDP reporting > linerate because of bad correction
- \* Send 2nd UDP BOD packet in case 1st is lost, e.g. waiting for ARP reply
- \* (makes UDP BOD more robust for new separate control and data paths)
- \* Fix bug with interval reports after EOD for UDP with small interval
- \* Don't just exit inetd server on no data so can get partial results
- \* (keep an eye out that servers don't start hanging again)
- \* Make default idle data timeout 1/2 of timeout if interval not set
- \* (with a minimum of 5 seconds and a maximum of 60 seconds)
- \* Make server send abort via urgent TCP data if no UDP data received
- \* (non-interval only: so client won't keep transmitting for full period)
- \* Workaround for Windows not handling TCP\_MAXSEG getsockopt()
- \* 5.3.4, Bill Fink, 21-Jun-06
- \* Add "--idle-data-timeout" server option
- \* (server ends transfer if no data received for the specified
- \* timeout interval, previously it was a fixed 60 second timeout)
- \* Shutdown client control connection for writing at end of UDP transfer
- \* (so server can cope better with loss of all EOD packets, which is
- \* mostly of benefit when using separate control and data paths)
- \* 5.3.3, Bill Fink & Mark S. Mathews, 18-Jun-06
- \* Add new capability for separate control and data paths
- \* (using syntax: nuttcp ctl\_name\_or\_IP/data\_name\_or\_IP)
- \* Extend new capability for multiple independent data paths
- \* (using syntax: nuttcp ctl/data1/data2/.../datan)
- \* Above only supported for transmit or flipped/reversed receive
- \* Fix -Wall compiler warnings on 64-bit systems
- \* Make manually started server also pass stderr to client
- \* (so client will get warning messages from server)
- \* 5.3.2, Bill Fink, 09-Jun-06
- \* Fix bug with default UDP buflen for 3rd party
- \* Fix compiler warnings with -Wall on FreeBSD
- \* Give warning that windows doesn't support TCP\_MAXSEG
- \* 5.3.1, Rob Scott, 06-Jun-06
- \* Add "-c" COS option for setting DSCP/TOS setting
- \* Fix builds on latest MacOS X
- \* Fix bug with 3rd party unlimited rate UDP not working
- \* Change "-M" option to require a value

- \* Fix compiler warnings with -Wall (thanks to Daniel J Blueman)
- \* Remove 'v' from nuttcp version (simplify RPM packaging)
- \* V5.2.2, Bill Fink, 13-May-06
- \* Have client report server warnings even if not verbose
- \* V5.2.1, Bill Fink, 12-May-06
- \* Pass "-M" option to server so it also works for receives
- \* Make "-uu" be a shortcut for "-u -Ru"
- \* V5.1.14, Bill Fink, 11-May-06
- \* Fix cancellation of UDP receives to work properly
- \* Allow easy building without IPv6 support
- \* Set default UDP buflen to largest 2^n less than MSS of ctlconn
- \* Add /usr/local/sbin and /usr/etc to path
- \* Allow specifying rate in pps by using 'p' suffix
- \* Give warning if actual send/receive window size is less than requested
- \* Make UDP transfers have a default rate limit of 1 Mbps
- \* Allow setting MSS for client transmitter TCP transfers with "-M" option
- \* Give more precision on reporting small UDP percentage data loss
- \* Disallow UDP transfers in "classic" mode
- \* Notify when using "classic" mode
- \* V5.1.13, Bill Fink, 8-Apr-06
- \* Make "-Ri" instantaneous rate limit for very high rates more accurate
- \* (including compensating for microsecond gettimeofday() granularity)
- \* Fix bug giving bogus time/stats on UDP transmit side with "-Ri"
- \* Allow fractional rate limits (for 'm' and 'g' only)
- \* V5.1.12, Bill Fink & Rob Scott, 4-Oct-05
- \* Terminate server receiver if client control connection goes away
- \* or if no data received from client within CHECK\_CLIENT\_INTERVAL
- \* V5.1.11, Rob Scott, 25-Jun-04
- \* Add support for scoped ipv6 addresses
- \* V5.1.10, Bill Fink, 16-Jun-04
- \* Allow 'b' suffix on "-w" option to specify window size in bytes
- \* V5.1.9, Bill Fink, 23-May-04
- \* Fix bug with client error on "-d" option putting server into bad state
- \* Set server accept timeout (currently 5 seconds) to prevent stuck server
- \* Add nuttcp version info to error message from err() exit
- \* V5.1.8, Bill Fink, 22-May-04
- \* Allow 'd|D' suffix to "-T" option to specify days
- \* Fix compiler warning about unused variable cp in getoptvalp routine
- \* Interval value check against timeout value should be >=
- \* V5.1.7, Bill Fink, 29-Apr-04
- \* Drop "-nb" option in favor of "-n###[k|m|g|t|p]"
- \* V5.1.6, Bill Fink, 25-Apr-04
- \* Fix bug with using interval option without timeout
- \* V5.1.5, Bill Fink, 23-Apr-04
- \* Modification to allow space between option parameter and its value
- \* Permit 'k' or 'm' suffix on "-l" option
- \* Add "-nb" option to specify number of bytes to transfer
- \* Permit 'k', 'm', 'g', 't', or 'p' suffix on "-n" and "-nb" options

- \* V5.1.4, Bill Fink, 21-Apr-04
- \* Change usage statement to use standard out instead of standard error
- \* Fix bug with interval > timeout, give warning and ignore interval
- \* Fix bug with counting error value in nbytes on interrupted transfers
- \* Fix bug with TCP transmitted & received nbytes not matching
- \* Merge "-t" and "-r" options in Usage: statement
- \* V5.1.3, Bill Fink, 9-Apr-04
- \* Add "-Sf" force server mode (useful for starting server via rsh/ssh)
- \* Allow non-root user to find nuttcp binary in "."
- \* Fix bug with receives terminating early with manual server mode
- \* Fix bug with UDP receives not terminating with "-Ri" option
- \* Clean up output formatting of nbuf (from "%d" to "%llu")
- \* Add "-SP" to have 3rd party use same outgoing control port as incoming
- \* V5.1.2, Bill Fink & Rob Scott, 18-Mar-04
- \* Fix bug with nbuf wrapping on really long transfers (int -> uint64\_t)
- \* Fix multicast address to be unsigned long to allow shift
- \* Add MacOS uint8\_t definition for new use of uint8\_t
- \* V5.1.1, Bill Fink, 8-Nov-03
- \* Add IPv4 multicast support
- \* Delay receiver EOD until EOD1 (for out of order last data packet)
- \* Above also drains UDP receive buffer (wait for fragmentation reassembly)
- \* V5.0.4, Bill Fink, 6-Nov-03
- \* Fix bug reporting 0 drops when negative loss percentage
- \* V5.0.3, Bill Fink, 6-Nov-03
- \* Kill server transmission if control connection goes away
- \* Kill 3rd party nuttcp if control connection goes away
- \* V5.0.2, Bill Fink, 4-Nov-03
- \* Fix bug: some dummy wasn't big enough :-)
- \* V5.0.1, Bill Fink, 3-Nov-03
- \* Add third party support
- \* Correct usage statement for "-xt" traceroute option
- \* Improved error messages on failed options requiring client/server mode
- \* V4.1.1, David Lapsley and Bill Fink, 24-Oct-03
- \* Added "-fparse" format option to generate key=value parsable output
- \* Fix bug: need to open data connection on abortconn to clear listen
- \* V4.0.3, Rob Scott, 13-Oct-03
- \* Minor tweaks to output format for alignment
- \* Interval option "-i" with no explicit value sets interval to 1.0
- \* V4.0.2, Bill Fink, 10-Oct-03
- \* Changed "-xt" option to do both forward and reverse traceroute
- \* Changed to use brief output by default ("-v" for old default behavior)
- \* V4.0.1, Rob Scott, 10-Oct-03
- \* Added IPv6 code
- \* Changed inet get functions to protocol independent versions
- \* Added fakepoll for hosts without poll() (macosx)
- \* Added ifdefs to only include setprio if os supports it (non-win)
- \* Added bits to handle systems without new inet functions (solaris < 2.8)
- \* Removed SYSV obsolete code

- \* Added ifdefs and code to handle cygwin and beginning of windows support
- \* Window size can now be in meg (m|M) and gig (g|G)
- \* Added additional directories to search for traceroute
- \* Changed default to transmit, time limit of 10 seconds, no buffer limit
- \* Added (h|H) as option to specify time in hours
- \* Added getservbyname calls for port, if all fails use old defaults
- \* Changed sockaddr to sockaddr\_storage to handle v6 addresses
- \* v3.7.1, Bill Fink, 10-Aug-03
- \* Add "-fdebugpoll" option to help debug polling for interval reporting
- \* Fix Solaris compiler warning
- \* Use poll instead of separate process for interval reports
- \* v3.6.2, Rob Scott, 18-Mar-03
- \* Allow setting server window to use default value
- \* Cleaned out BSD42 old code
- \* Marked SYSV code for future removal as it no longer appears necessary
- \* Also set RCVBUF/SNDBUF for udp transfers
- \* Changed transmit SO\_DEBUG code to be like receive
- \* Some code rearrangement for setting options before accept/connect
- \* v3.6.1, Bill Fink, 1-Mar-03
- \* Add -xP nuttcp process priority option
- \* Add instantaneous rate limit capability ("-Ri")
- \* Don't open data connection if server error or doing traceroute
- \* Better cleanup on server connection error (close open data connections)
- \* Don't give normal nuttcp output if server error requiring abort
- \* Implement -xt traceroute option
- \* v3.5.1, Bill Fink, 27-Feb-03
- \* Don't allow flip option to be used with UDP
- \* Fix bug with UDP and transmit interval option (set stdin unbuffered)
- \* Fix start of UDP timing to be when get BOD
- \* Fix UDP timing when don't get first EOD
- \* Fix ident option used with interval option
- \* Add "-f-percentloss" option to not give %loss info on brief output
- \* Add "-f-drops" option to not give packet drop info on brief output
- \* Add packet drop info to UDP brief output (interval report and final)
- \* Add "-frunningtotal" option to give cumulative stats for "-i"
- \* Add "-fdebuginterval" option to help debug interval reporting
- \* Add "-fxmitstats" option to give transmitter stats
- \* Change flip option from "-f" to "-F"
- \* Fix divide by zero bug with "-i" option and very low rate limit
- \* Fix to allow compiling with Irix native compiler
- \* Fix by Rob Scott to allow compiling on MacOS X
- \* v3.4.5, Bill Fink, 29-Jan-03
- \* Fix client/server endian issues with UDP loss info for interval option
- \* v3.4.4, Bill Fink, 29-Jan-03
- \* Remove some debug printout for interval option
- \* Fix bug when using interval option reporting 0.000 MB on final
- \* v3.4.3, Bill Fink, 24-Jan-03
- \* Added UDP approximate loss info for interval reporting

- \* Changed nbytes and pbytes from double to uint64\_t
- \* Changed SIGUSR1 to SIGTERM to kill sleeping child when done
- \* v3.4.2, Bill Fink, 15-Jan-03
- \* Make <control-C> work right with receive too
- \* v3.4.1, Bill Fink, 13-Jan-03
- \* Fix bug interacting with old servers
- \* Add "-f" flip option to reverse direction of data connection open
- \* Fix bug by disabling interval timer when server done
- \* v3.3.2, Bill Fink, 11-Jan-03
- \* Make "-i" option work for client transmit too
- \* Fix bug which forced "-i" option to be at least 0.1 seconds
- \* v3.3.1, Bill Fink, 7-Jan-03
- \* Added -i option to set interval timer (client receive only)
- \* Fixed server bug not setting socket address family
- \* v3.2.1, Bill Fink, 25-Feb-02
- \* Fixed bug so second <control-C> will definitely kill nuttcp
- \* Changed default control port to 5000 (instead of data port - 1)
- \* Modified -T option to accept fractional seconds
- \* v3.1.10, Bill Fink, 6-Feb-02
- \* Added -I option to identify nuttcp output
- \* Made server always verbose (filtering is done by client)
- \* Update to usage statement
- \* Minor fix to "-b" output when "-D" option is used
- \* Fix bug with "-s" that appends nuttcp output to receiver data file
- \* Fix bug with "-b" that gave bogus CPU utilization on > 1 hour transfers
- \* v3.1.9, Bill Fink, 21-Dec-01
- \* Fix bug with "-b" option on SGI systems reporting 0% CPU utilization
- \* v3.1.8, Bill Fink, 21-Dec-01
- \* Minor change to brief output format to make it simpler to awk
- \* v3.1.7, Bill Fink, 20-Dec-01
- \* Implement "-b" option for brief output (old "-b" -> "-wb")
- \* Report udp loss percentage when using client/server mode
- \* Fix bug with nbytes on transmitter using timed transfer
- \* Combined send/receive window size printout onto a single line
- \* v3.1.6, Bill Fink, 11-Jun-01
- \* Fixed minor bug reporting error connecting to inetd server
- \* Previously, Bill Fink, 7-Jun-01
- \* Added -h (usage) and -V (version) options
- \* Fixed SGI compilation warnings
- \* Added reporting server version to client
- \* Added version info and changed tcp prints to nuttcp
- \* Fixed bug with inetd server and client using -r option
- \* Added ability to run server from inetd
- \* Added udp capability to server option
- \* Added -T option to set timeout interval
- \* Added -ws option to set server window
- \* Added -S option to support running receiver as daemon
- \* Allow setting UDP buflen up to MAXUDPBUFLen

- \* Provide -b option for braindead Solaris 2.8
- \* Added printing of transmit rate limit
- \* Added -w option to usage statement
- \* Added -N option to support multiple streams
- \* Added -R transmit rate limit option
- \* Fix setting of destination IP address on 64-bit Irix systems
- \* Only set window size in appropriate direction to save memory
- \* Fix throughput calculation for large transfers (>= 2 GB)
- \* Fix reporting of Mb/s to give actual millions of bits per second
- \* Fix setting of INET address family in local socket
- \* Fix setting of receiver window size
- \*
- \* TODO/Wish-List:
- \* Transmit interval marking option
- \* Allow at least some traceroute options
- \* Add "-ut" option to do both UDP and TCP simultaneously
- \* Default rate limit UDP if too much loss
- \* Ping option
- \* Other brief output formats
- \* Linux window size bug/feature note
- \* Network interface interrupts (for Linux only)
- \* netstat -i info
- \* Man page
- \* Forking for multiple streams
- \* Bidirectional option
- \* Graphical interface
- \* MTU info
- \* Warning for window size limiting throughput
- \* Auto window size optimization
- \* Transmitter profile and playback options
- \* Server side limitations (per client host/network)
- \* Server side logging
- \* Client/server security (password)
- \* nuttcp server registration
- \* nuttcp proxy support (firewalls)
- \* nuttcp network idle time
- \*
- \* Distribution Status -
- \* OpenSource(tm)
- \* Licensed under version 2 of the GNU GPL
- \* Please send source modifications back to the authors
- \* Derivative works should be redistributed with a modified
- \* source and executable name
- \*/
  
- /\*
- #ifndef lint
- static char RCSid[] = "@(#) \$Revision: 1.2 \$ (BRL)";



```

#endif
*/

#ifndef WANT_WUR
#undef _FORTIFY_SOURCE
#else
#define _FORTIFY_SOURCE 2
#endif

#define _FILE_OFFSET_BITS 64

#if defined(linux)
#define _GNU_SOURCE
#endif

#include <stdio.h>
#include <signal.h>
#include <ctype.h>
#include <errno.h>
#include <sys/types.h>
#include <sys/time.h> /* struct timeval */
#include <stdlib.h>

#ifndef _WIN32
#include <sys/socket.h>
#include <netinet/in.h>
#include <netinet/tcp.h>
#include <arpa/inet.h>
#include <netdb.h>
#include <sys/resource.h>
#else
#include "win32nuttcp.h" /* from win32 */
#endif /* _WIN32 */

#include <limits.h>
#include <string.h>
#include <fcntl.h>

#if defined(linux)
#include <sys/stat.h>
#include <sys/sendfile.h>
#include <sys/ioctl.h>
#include <linux/sockios.h>
#endif

/* Let's try changing the previous unwieldy check */
/* #if defined(linux) || defined(__FreeBSD__) || defined(sgi) || (defined(__MACH__) && defined(_SOCKLEN_T))
|| defined(sparc) || defined(__CYGWIN__) */

```

```

/* to the following (hopefully equivalent) simpler form like we use
* for HAVE_POLL */
#if !defined(_WIN32) && (!defined(__MACH__) || defined(_SOCKLEN_T))
#include <unistd.h>
#include <sys/wait.h>
#include <strings.h>
#endif

#ifndef ULLONG_MAX
#define ULLONG_MAX 18446744073709551615ULL
#endif

#define MAXRATE 0xffffffffUL

#if !defined(__CYGWIN__) && !defined(_WIN32)
#define HAVE_SETPRIO
#endif

#if defined(linux)
#define HAVE_SETAFFINITY
#endif

#if !defined(_WIN32) && (!defined(__MACH__) || defined(_SOCKLEN_T))
#define HAVE_POLL
#endif

#if defined(__APPLE__) && defined(__MACH__)
#define uint64_t u_int64_t
#define uint32_t u_int32_t
#define uint16_t u_int16_t
#define uint8_t u_int8_t
#endif

#ifdef HAVE_POLL
#include <sys/poll.h>
#else
#include "fakepoll.h" /* from missing */
#endif

#ifdef HAVE_SETAFFINITY
#include <sched.h>
#endif

#ifndef CPU_SETSIZE
#undef HAVE_SETAFFINITY
#endif

/*

```

```

* _SOCKLEN_T is now defined by apple when they typedef socklen_t
*
* EAI_NONAME has nothing to do with socklen, but on sparc without it tells
* us it's an old enough solaris to need the typedef
*/
#if (defined(__APPLE__) && defined(__MACH__)) && !defined(_SOCKLEN_T) || (defined(sparc) &&
!defined(EAI_NONAME))
typedef int socklen_t;
#endif

#if defined(sparc) && !defined(EAI_NONAME) /* old sparc */
#define sockaddr_storage sockaddr
#define ss_family sa_family
#endif /* old sparc */

#if defined(_AIX) && !defined(HAVE_SS_FAMILY)
#define ss_family __ss_family
#endif

#if !defined(EAI_NONAME)
#include "addrinfo.h" /* from missing */
#endif

#define BETA_STR "-beta8"
#define BETA_FEATURES "jitter/owd"

union sockaddr_union {
    struct sockaddr_storage ss;
    struct sockaddr_in sin;
    struct sockaddr_in6 sin6;
};

static struct timeval time0; /* Time at which timing started */
static struct timeval timepk; /* Time at which last packet sent */
static struct timeval timepkr; /* Time at which last packet received */
static struct timeval timepkri; /* timepkr for interval reports */
static struct timeval timep; /* Previous time - for interval reporting */
static struct timeval timetx; /* Transmitter timestamp */
static struct timeval timerx; /* Receive timestamp */
static struct rusage ru0; /* Resource utilization at the start */

static struct sigaction sigact; /* signal handler for alarm */
static struct sigaction savesigact;

#define PERF_FMT_OUT "%.4f MB in %.2f real seconds = %.2f KB/sec" \
    " = %.4f Mbps\n"
#define PERF_FMT_BRIEF "%10.4f MB / %6.2f sec = %9.4f Mbps %d %%TX %d %%RX"
#define PERF_FMT_BRIEF2 "%10.4f MB / %6.2f sec = %9.4f Mbps %d %% %s"

```

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#define PERF_FMT_BRIEF3 " Trans: %.4f MB"
#define PERF_FMT_INTERVAL "%10.4f MB / %6.2f sec = %9.4f Mbps"
#define PERF_FMT_INTERVAL2 " Tot: %10.4f MB / %6.2f sec = %9.4f Mbps"
#define PERF_FMT_INTERVAL3 " Trans: %10.4f MB"
#define PERF_FMT_INTERVAL4 " Tot: %10.4f MB"
#define PERF_FMT_IN "%lf MB in %lf real seconds = %lf KB/sec = %lf Mbps\n"
#define CPU_STATS_FMT_IN "%*fuser %*fsys %*d:%*dreal %d%%"
#define CPU_STATS_FMT_IN2 "%*fuser %*fsys %*d:%*d:%*dreal %d%%"

#define LOSS_FMT ".2f%% data loss"
#define LOSS_FMT_BRIEF ".2f %% loss"
#define LOSS_FMT_INTERVAL "%5.2f ~%% loss"
#define LOSS_FMT5 ".5f%% data loss"
#define LOSS_FMT_BRIEF5 ".5f %% loss"
#define LOSS_FMT_INTERVAL5 "%7.5f ~%% loss"
#define DROP_FMT "%lld / %lld drop/pkt"
#define DROP_FMT_BRIEF "%lld / %lld drop/pkt"
#define DROP_FMT_INTERVAL "%5lld / %5lld ~drop/pkt"
#define JITTER_MIN 1
#define JITTER_AVG 2
#define JITTER_MAX 4
#define JITTER_IGNORE_OOO 8
#define JITTER_FMT "min-jitter = %.4f ms, avg-jitter = %.4f ms, " \
    "max-jitter = %.4f ms"
#define JITTER_MIN_FMT_BRIEF ".4f msMinJitter"
#define JITTER_AVG_FMT_BRIEF ".4f msAvgJitter"
#define JITTER_MAX_FMT_BRIEF ".4f msMaxJitter"
#define JITTER_MIN_FMT_INTERVAL ".4f msMinJitter"
#define JITTER_AVG_FMT_INTERVAL ".4f msAvgJitter"
#define JITTER_MAX_FMT_INTERVAL ".4f msMaxJitter"
#define JITTER_FMT_IN "jitter = %lf ms, avg-jitter = %lf ms, " \
    "max-jitter = %lf ms"
#define OWD_MIN 1
#define OWD_AVG 2
#define OWD_MAX 4
#define OWD_FMT "min-OWD = %.4f ms, avg-OWD = %.4f ms, " \
    "max-OWD = %.4f ms"
#define OWD_MIN_FMT_BRIEF ".4f msMinOWD"
#define OWD_AVG_FMT_BRIEF ".4f msAvgOWD"
#define OWD_MAX_FMT_BRIEF ".4f msMaxOWD"
#define OWD_MIN_FMT_INTERVAL ".4f msMinOWD"
#define OWD_AVG_FMT_INTERVAL ".4f msAvgOWD"
#define OWD_MAX_FMT_INTERVAL ".4f msMaxOWD"
#define OWD_FMT_IN "OWD = %lf ms, avg-OWD = %lf ms, max-OWD = %lf ms"
#define RETRANS_FMT "%sretrans = %d"
#define RETRANS_FMT_BRIEF "%d %sretrans"
#define RETRANS_FMT_BRIEF_STR1 "%d = %d"
#define RETRANS_FMT_BRIEF_STR2 "retrans"

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```

#define RETRANS_FMT_INTERVAL " %5d %sretrans"
#define RETRANS_FMT_IN "retrans = %d"
#define RTT_FMT " RTT=%.3f ms"
#define RTT_FMT_BRIEF " %.2f msRTT"
#define RTT_FMT_IN "RTT=%lf"
#define RTT_FMT_INB "RTT = %lf"
#define SIZEOF_TCP_INFO_RETRANS 104

/* define NEW_TCP_INFO if struct tcp_info in /usr/include/netinet/tcp.h
* contains tcpi_total_retrans member
*
* tcpi_rcv_rtt, tcpi_rcv_space, & tcpi_total_retrans were added
* in glibc-headers-2.7 (Fedora 8) which fortunately also defined
* TCP_MD5SIG at the same time, so key off of that
*/
#if defined(linux) && defined(TCP_MD5SIG)
#define NEW_TCP_INFO
#endif

#ifndef NEW_TCP_INFO
#define OLD_TCP_INFO
#endif

/* Parsable output formats */

#define P_PERF_FMT_OUT " megabytes=%.4f real_seconds=%.2f " \
    "rate_KBps=%.2f rate_Mbps=%.4f\n"
#define P_PERF_FMT_BRIEF " megabytes=%.4f real_seconds=%.2f rate_Mbps=%.4f " \
    "tx_cpu=%d rx_cpu=%d"
#define P_PERF_FMT_BRIEF3 " tx_megabytes=%.4f"
#define P_PERF_FMT_INTERVAL " megabytes=%.4f real_sec=%.2f rate_Mbps=%.4f"
#define P_PERF_FMT_INTERVAL2 " total_megabytes=%.4f total_real_sec=%.2f" \
    " total_rate_Mbps=%.4f"
#define P_PERF_FMT_INTERVAL3 " tx_megabytes=%.4f"
#define P_PERF_FMT_INTERVAL4 " tx_total_megabytes=%.4f"
#define P_PERF_FMT_IN " megabytes=%lf real_seconds=%lf rate_KBps=%lf " \
    "rate_Mbps=%lf\n"
#define P_CPU_STATS_FMT_IN "user=%*f system=%*f elapsed=%*d:%*d cpu=%d%%"
#define P_CPU_STATS_FMT_IN2 "user=%*f system=%*f elapsed=%*d:%*d:%*d cpu=%d%%"

#define P_LOSS_FMT " data_loss=%.5f"
#define P_LOSS_FMT_BRIEF " data_loss=%.5f"
#define P_LOSS_FMT_INTERVAL " data_loss=%.5f"
#define P_DROP_FMT " drop=%lld pkt=%lld"
#define P_DROP_FMT_BRIEF " drop=%lld pkt=%lld"
#define P_DROP_FMT_INTERVAL " drop=%lld pkt=%lld"
#define P_JITTER_FMT "msminjitter=%.4f msavgjitter=%.4f " \
    "msmaxjitter=%.4f"

```

```

#define P_JITTER_MIN_FMT_BRIEF " msminjitter=%.4f"
#define P_JITTER_AVG_FMT_BRIEF " msavgjitter=%.4f"
#define P_JITTER_MAX_FMT_BRIEF " msmaxjitter=%.4f"
#define P_JITTER_MIN_FMT_INTERVAL " msminjitter=%.4f"
#define P_JITTER_AVG_FMT_INTERVAL " msavgjitter=%.4f"
#define P_JITTER_MAX_FMT_INTERVAL " msmaxjitter=%.4f"
#define P_JITTER_FMT_IN "jitter=%lf msavgjitter=%lf msmaxjitter=%lf"
#define P_OWD_FMT "msminOWD=%.4f msavgOWD=%.4f msmaxOWD=%.4f"
#define P_OWD_MIN_FMT_BRIEF " msminOWD=%.4f"
#define P_OWD_AVG_FMT_BRIEF " msavgOWD=%.4f"
#define P_OWD_MAX_FMT_BRIEF " msmaxOWD=%.4f"
#define P_OWD_MIN_FMT_INTERVAL " msminOWD=%.4f"
#define P_OWD_AVG_FMT_INTERVAL " msavgOWD=%.4f"
#define P_OWD_MAX_FMT_INTERVAL " msmaxOWD=%.4f"
#define P_OWD_FMT_IN "OWD=%lf msavgOWD=%lf msmaxOWD=%lf"
#define P_RETRANS_FMT "%sretrans=%d"
#define P_RETRANS_FMT_STREAMS " retrans_by_stream=%d"
#define P_RETRANS_FMT_BRIEF " %sretrans=%d"
#define P_RETRANS_FMT_INTERVAL " %sretrans=%d"
#define P_RETRANS_FMT_IN "retrans=%d"
#define P_RTT_FMT " rtt_ms=%.3f"
#define P_RTT_FMT_BRIEF " rtt_ms=%.2f"
#define P_RTT_FMT_IN "rtt_ms=%lf"

#define HELO_FMT "HELO nuttcp v%d.%d.%d\n"

#ifndef MAXSTREAM
#define MAXSTREAM 128
#endif
#define DEFAULT_NBUF 2048
#define DEFAULT_NBYTES 134217728 /* 128 MB */
#define DEFAULT_TIMEOUT 10.0
#define DEFAULT_UDP_RATE 1000
#define DEFAULTUDPBUFLLEN 8192
#define DEFAULT_MC_UDPBUFLLEN 1024
#define MAXUDPBUFLLEN 65507
#define LOW_RATE_HOST3 1000
#define MINMALLOC 1024
#define HI_MC 231ul
#define HI_MC_SSM 232ul
/* locally defined global scope IPv6 multicast, FF3E::8000:0-FF3E::FFFF:FFFF */
#define HI_MC6 "FF3E::8000:0000"
#define HI_MC6_LEN 13
#define HI_MC6_ASM "FF2E::0"
#define HI_MC6_ASM_LEN 8
#ifndef LISTEN_BACKLOG
#define LISTEN_BACKLOG 64
#endif

```

```

#define ACCEPT_TIMEOUT 5
#ifndef MAX_CONNECT_TRIES
#define MAX_CONNECT_TRIES 10 /* maximum server connect attempts */
#endif
#ifndef SERVER_RETRY_USEC
#define SERVER_RETRY_USEC 500000 /* server retry time in usec */
#endif
#define MAX_EOT_WAIT_SEC 60.0 /* max wait for unsent data at EOT */
#define SRVR_INFO_TIMEOUT 60 /* timeout for reading server info */
#define IDLE_DATA_MIN 15.0 /* minimum value for chk_idle_data */
#define DEFAULT_IDLE_DATA 30.0 /* default value for chk_idle_data */
#define IDLE_DATA_MAX 60.0 /* maximum value for chk_idle_data */
#define NON_JUMBO_ETHER_MSS 1448 /* 1500 - 20:IP - 20:TCP - 12:TCPOPTS */
#define TCP_UDP_HDRLEN_DELTA 12 /* difference in tcp & udp hdr sizes */
#define TCP_TIMESTAMPS_OPTLEN 12 /* size of TCP timestamps options */

#if defined(linux)
#define TCP_ADV_WIN_SCALE "/proc/sys/net/ipv4/tcp_adv_win_scale"
#endif

#define BRIEF_RETRANS_STREAMS 0x2 /* brief per stream retrans info */

#define XMITSTATS 0x1 /* also give transmitter stats (MB) */
#define DEBUGINTERVAL 0x2 /* add info to assist with
    * debugging interval reports */
#define RUNNINGTOTAL 0x4 /* give cumulative stats for "-i" */
#define NODROPS 0x8 /* no packet drop stats for "-i" */
#define NOPERCENTLOSS 0x10 /* don't give percent loss for "-i" */
#define DEBUGPOLL 0x20 /* add info to assist with debugging
    * polling for interval reports */
#define PARSE 0x40 /* generate key=value parsable output */
#define DEBUGMTU 0x80 /* debug info for MTU/MSS code */
#define NORETRANS 0x100 /* no retrans stats for "-i" */
#define DEBUGRETRANS 0x200 /* output info for debugging collection
    * of TCP retransmission info */
#define NOBETAMSG 0x400 /* suppress beta version message */
#define WANTRTT 0x800 /* output RTT info (default) */
#define DEBUGJITTER 0x1000 /* debugging info for jitter option */

#ifdef NO_IPV6 /* Build without IPv6 support */
#undef AF_INET6
#undef IPV6_V6ONLY
#endif

void sigpipe( int signum );
void sigint( int signum );
void ignore_alarm( int signum );
void sigalarm( int signum );

```

```

static void err( char *s );
static void mes( char *s );
static void errmes( char *s );
void pattern( char *cp, int cnt );
void prep_timer();
double read_timer( char *str, int len );
static void prusage( struct rusage *r0, struct rusage *r1, struct timeval *e, struct timeval *b, char *outp );
static void tvadd( struct timeval *tsum, struct timeval *t0, struct timeval *t1 );
static void tvsub( struct timeval *tdiff, struct timeval *t1, struct timeval *t0 );
static void psecs( long l, char *cp );
int Nread( int fd, char *buf, int count );
int Nwrite( int fd, char *buf, int count );
int delay( int us );
int mread( int fd, char *bufp, unsigned n );
int mwrite( int fd, char *bufp, unsigned n, int last_write );
char *getoptvalp( char **argv, int index, int reqval, int *skiparg );

int get_retrans( int sockfd );

#ifdef linux && defined(TCPI_OPT_TIMESTAMPS)
void print_tcpinfo();
#endif

int vers_major = 7;
int vers_minor = 3;
int vers_delta = 3;
int ivers;
int rvers_major = 0;
int rvers_minor = 0;
int rvers_delta = 0;
int irvers;
int beta = 0;

struct sockaddr_in sinme[MAXSTREAM + 1];
struct sockaddr_in sinhim[MAXSTREAM + 1];
struct sockaddr_in save_sinhim, save_mc;

#ifdef AF_INET6
struct sockaddr_in6 sinme6[MAXSTREAM + 1];
struct sockaddr_in6 sinhim6[MAXSTREAM + 1];
struct sockaddr_in6 save_sinhim6, save_mc6;
struct in6_addr hi_mc6, hi_mc6_asm;
#endif

struct sockaddr_storage frominet;

int domain = PF_UNSPEC;
int af = AF_UNSPEC;

```



```

int mc_af = AF_UNSPEC;
int explicitaf = 0; /* address family explicit specified (-4|-6) */
int fd[MAXSTREAM + 1]; /* fd array of network sockets */
int nfd; /* fd for accept call */
struct pollfd pollfds[MAXSTREAM + 4]; /* used for reading interval reports */
socklen_t fromlen;

int buflen = 64 * 1024; /* length of buffer */
int nbufen;
int malloysize;
char *buf; /* ptr to dynamic buffer */
unsigned long long nbuf = 0; /* number of buffers to send in sinkmode */
int nbuf_bytes = 0; /* set to 1 if nbuf is actually bytes */

/* nick code */
int sendwin=0, sendwinval=0, origsendwin=0;
socklen_t optlen;
int rcvwin=0, rcvwinval=0, origrcvwin=0;
int srvrwin=0;
/* end nick code */

#if defined(linux)
int sendwinavail=0, rcvwinavail=0, winadjust=0;
#endif

#if defined(linux) && defined(TCPI_OPT_TIMESTAMPS)
#ifdef OLD_TCP_INFO
struct tcpinfo { /* for collecting TCP retransmission info */
    struct tcp_info _tcpinf;
    /* add missing structure elements */
    u_int32_t tcpi_rcv_rtt;
    u_int32_t tcpi_rcv_space;
    u_int32_t tcpi_total_retrans;
} tcpinf;
#define tcpinfo_state _tcpinf.tcpi_state
#define tcpinfo_ca_state _tcpinf.tcpi_ca_state
#define tcpinfo_retransmits _tcpinf.tcpi_retransmits
#define tcpinfo_unacked _tcpinf.tcpi_unacked
#define tcpinfo_sacked _tcpinf.tcpi_sacked
#define tcpinfo_lost _tcpinf.tcpi_lost
#define tcpinfo_retrans _tcpinf.tcpi_retrans
#define tcpinfo_fackets _tcpinf.tcpi_fackets
#define tcpinfo_rtt _tcpinf.tcpi_rtt
#define tcpinfo_rttvar _tcpinf.tcpi_rttvar
#define tcpinfo_snd_ssthresh _tcpinf.tcpi_snd_ssthresh
#define tcpinfo_snd_cwnd _tcpinf.tcpi_snd_cwnd
#else
struct tcp_info tcpinf;

```

```

#define tcpinfo_state    tcpi_state
#define tcpinfo_ca_state tcpi_ca_state
#define tcpinfo_retransmits tcpi_retransmits
#define tcpinfo_unacked  tcpi_unacked
#define tcpinfo_sacked   tcpi_sacked
#define tcpinfo_lost     tcpi_lost
#define tcpinfo_retrans  tcpi_retrans
#define tcpinfo_fackets  tcpi_fackets
#define tcpinfo_rtt     tcpi_rtt
#define tcpinfo_rttvar   tcpi_rttvar
#define tcpinfo_snd_ssthresh tcpi_snd_ssthresh
#define tcpinfo_snd_cwnd tcpi_snd_cwnd
#endif
#endif

int udp = 0;          /* 0 = tcp, !0 = udp */
int udplossinfo = 0; /* set to 1 to give UDP loss info for
                    * interval reporting */
int do_jitter = 0;   /* set to 1 to enable jitter measurements */
int do_owd = 0;     /* set to 1 to enable one-way delay reports */

int retransinfo = 0; /* set to 1 to give TCP retransmission info
                    * for interval reporting */
int force_retrans = 0; /* set to force sending retrans info */
int send_retrans = 1; /* set to 0 if no need to send retrans info */
int do_retrans = 0; /* set to 1 for client transmitter */
int read_retrans = 1; /* set to 0 if no need to read retrans info */
int got_0retrans = 0; /* set to 1 by client transmitter after
                    * processing initial server output
                    * having "0 retrans" */

int need_swap;      /* client and server are different endian */
int options = 0;    /* socket options */
int one = 1;        /* for 4.3 BSD style setsockopt() */
/* default port numbers if command arg or getserv doesn't get a port # */
#define DEFAULT_PORT 5101
#define DEFAULT_CTLPORT 5000
#define IPERF_PORT 5001
unsigned short port = 0; /* TCP port number */
unsigned short srcport = 0; /* TCP source port */
unsigned short ctlport = 0; /* control port for server connection */
unsigned short srctlport = 0; /* TCP source port for server connection */
unsigned short ctlport3 = 0; /* control port for 3rd party server conn */
int tmpport;
char *host;         /* ptr to name of host */
char *stride = NULL; /* ptr to address stride for multi-stream */
char *host3 = NULL; /* ptr to 3rd party host */
int thirdparty = 0; /* set to 1 indicates doing 3rd party nuttcp */

```

```

int no3rd = 0;      /* set to 1 by server to disallow 3rd party */
int forked = 0;    /* set to 1 after server has forked */
int pass_ctlport = 0; /* set to 1 to use same outgoing control port
                    as incoming with 3rd party usage */
char *nut_cmd;     /* command used to invoke nuttcp */
char *cmdargs[50]; /* command arguments array */
char tmpargs[50][50];

#ifndef AF_INET6
#define ADDRSTRLEN 16
#else
#define ADDRSTRLEN INET6_ADDRSTRLEN
int v4mapped = 0; /* set to 1 to enable v4 mapping in v6 server */
#endif

#define HOSTNAMELEN 80
#define HOST3BUFLLEN HOSTNAMELEN + 2 + ADDRSTRLEN + 1 + ADDRSTRLEN
/* host3=[=]host3addr[+host3stride] */

char hostbuf[ADDRSTRLEN]; /* buffer to hold text of address */
char host3addr[ADDRSTRLEN]; /* buffer to hold text of 3rd party address */
char host3buf[HOST3BUFLLEN + 1]; /* buffer to hold 3rd party name or address */
char clientbuf[NI_MAXHOST]; /* buffer to hold client's resolved hostname */
int trans = 1; /* 0=receive, !0=transmit mode */
int sinkmode = 1; /* 0=normal I/O, !0=sink/source mode */
#ifdef linux
int zerocopy = 0; /* set to enable zero copy via sendfile() */
int directio = 0; /* set to enable direct I/O */
#endif
int nofork = 0; /* set to 1 to not fork server */
int verbose = 0; /* 0=print basic info, 1=print cpu rate, proc
                * resource usage. */
int nodelay = 0; /* set TCP_NODELAY socket option */
unsigned long rate = MAXRATE; /* transmit rate limit in Kbps */
int maxburst = 1; /* number of packets allowed to exceed rate */
int nburst = 1; /* number of packets currently exceeding rate */
int irate = -1; /* instantaneous rate limit if set */
double pkt_time; /* packet transmission time in seconds */
double pkt_time_ms; /* packet transmission time in milliseconds */
uint64_t irate_pk_usec; /* packet transmission time in microseconds */
double irate_pk_nsec; /* nanosecond portion of pkt xmit time */
double irate_cum_nsec = 0.0; /* cumulative nanoseconds over several pkts */
int rate_pps = 0; /* set to 1 if rate is given as pps */
double timeout = 0.0; /* timeout interval in seconds */
double interval = 0.0; /* interval timer in seconds */
double chk_idle_data = 0.0; /* server receiver checks this often
                             /* for client having gone away */
double chk_interval = 0.0; /* timer (in seconds) for checking client */

```

```

int ctlconnmss;    /* control connection maximum segment size */
int datamss = 0;  /* data connection maximum segment size */
unsigned int tos = 0; /* 8-bit TOS field for setting DSCP/TOS */
char intervalbuf[256+2]; /* buf for interval reporting */
char linebuf[256+2]; /* line buffer */
int do_poll = 0; /* set to read interval reports (client xmit) */
int got_done = 0; /* set when read last of interval reports */
int reverse = 0; /* reverse direction of data connection open */
int format = 0; /* controls formatting of output */
char fmt[257];
int traceroute = 0; /* do traceroute back to client if set */
int skip_data = 0; /* skip opening of data channel */
#ifdef linux
int multicast = 0; /* set to 1 for multicast UDP transfer */
#else
uint8_t multicast = 0; /* set to 1 for multicast UDP transfer */
#endif
int ssm = -1; /* set to 1 for Source Specific Multicast */
/* set to 0 to NOT do SSM */
/* set to -1 to have SSM follow protocol */
/* (off for ipv4, on for ipv6) */
int mc_param;
char *mc_addr = NULL; /* user specified multicast IP address */
char mcgaddr[ADDRSTRLEN]; /* buffer to hold text of MC group address */
struct ip_mreq mc_group; /* holds multicast group address */
#ifdef AF_INET6
struct ipv6_mreq mc6_group; /* holds multicast group address */
#endif
#ifdef MCAST_JOIN_SOURCE_GROUP
struct group_source_req group_source_req; /* holds multicast SSM group and */
/* source information */
#endif

#ifdef HAVE_SETPRIO
int priority = 0; /* nuttcp process priority */
#endif

/* affinity and srvr_affinity need to be defined even if don't
* HAVE_SETAFFINITY, to make parameter passing between client and
* server work out OK, since far end may HAVE_SETAFFINITY
*
* they are set to -1 so they have no effect even if don't
* HAVE_SETAFFINITY
*/
int affinity = -1; /* nuttcp process CPU affinity */
int srvr_affinity = -1; /* nuttcp server process CPU affinity */

#ifdef HAVE_SETAFFINITY

```

```

int ncores = 1;    /* number of CPU cores */
cpu_set_t cpu_set; /* processor CPU set */
#endif

long timeout_sec = 0;
struct itimerval itimer; /* for setitimer */
int srvr_helo = 1; /* set to 0 if server doesn't send HELO */
char ident[40 + 1 + 1] = ""; /* identifier for nuttcp output */
int intr = 0;
int abortconn = 0;
int braindead = 0; /* for braindead Solaris 2.8 systems */
int brief = 1; /* set for brief output */
int brief3 = 1; /* for third party nuttcp */
int done = 0; /* don't output interval report if done */
int got_begin = 0; /* don't output interval report if not begun */
int two_bod = 0; /* newer versions send 2 BOD packets for UDP */
int handle_urg = 0; /* newer versions send/recv urgent TCP data */
int got_eod0 = 0; /* got EOD0 packet - marks end of UDP xfer */
int buflenopt = 0; /* whether or not user specified buflen */
int haverateopt = 0; /* whether or not user specified rate */
int clientserver = 0; /* client server mode (use control channel) */
int client = 0; /* 0=server side, 1=client (initiator) side */
int oneshot = 0; /* 1=run server only once */
int inetd = 0; /* set to 1 if server run from inetd */
pid_t pid; /* process id when forking server process */
pid_t wait_pid; /* return of wait system call */
int pidstat; /* status of forked process */
FILE *ctlconn; /* uses fd[0] for control channel */
int savestdin; /* used to save real standard in */
int savestdout; /* used to save real standard out */
int firsttime = 1; /* flag for first pass through server */
struct in_addr clientaddr; /* IP address of client connecting to server */

#ifdef AF_INET6
struct in6_addr clientaddr6; /* IP address of client connecting to server */
uint32_t clientscope6; /* scope part of IP address of client */
#endif

struct hostent *addr;
extern int errno;

const char Usage[] = "\
Usage: nuttcp or nuttcp -h prints this usage info\n\
Usage: nuttcp -V prints version info\n\
Usage: nuttcp -xt [-m] host forward and reverse traceroute to/from server\n\
Usage (transmitter): nuttcp [-t] [-options] [ctl_addr/]host [3rd-party] [<in]\n\
 (receiver): nuttcp -r [-options] [host] [3rd-party] [>out]\n\
-4 Use IPv4\n"

```

```

#ifdef AF_INET6
" -6 Use IPv6\n"
#endif
" -c## cos dscp value on data streams (t|T suffix for full TOS field)\n\
-l## length of network write/read buf (default 1K|8K|udp, 64K|tcp)\n"
#if defined(linux)
" -s[d][z] use stdin/stdout for data input/output instead of pattern data\n"
" ('d' suboption uses direct I/O if input/output is regular file)\n"
" ('z' suboption enables zero copy tx if input is regular file)\n"
#else
" -s use stdin/stdout for data input/output instead of pattern data\n"
#endif
" -n## number of source bufs written to network (default unlimited)\n\
-w## transmitter|receiver window size in KB (or (m|M)B or (g|G)B)\n\
-ws## server receive|transmit window size in KB (or (m|M)B or (g|G)B)\n\
-wb braindead Solaris 2.8 (sets both xmit and rcv windows)\n\
-p## port number to send to|listen at (default 5101)\n\
-p#:# specify both source:destination port for -p option\n\
-P## port number for control connection (default 5000)\n\
-P#:# specify both source:destination port for -P option\n\
-P## control port to/from 3rd-party host (default 5000)\n\
-u use UDP instead of TCP\n\
-m## use multicast with specified TTL instead of unicast (UDP)\n\
-gxxx user specified multicast IP address for -m option\n\
-M## MSS for data connection (TCP)\n\
-N## number of streams (starting at port number), implies -B\n\
-R## transmit rate limit in Kbps (or (m|M)bps or (g|G)bps or (p)ps)\n\
-Ri#[/#] instantaneous rate limit with optional packet burst\n\
-T## transmit timeout in seconds (or (m|M)inutes or (h|H)ours)\n\
-j enable jitter measurements (assumes -u and -Ri options)\n\
-o enable one-way delay reports (needs synchronized clocks)\n\
-i## receiver interval reporting in seconds (or (m|M)inutes)\n\
-Ixxx identifier for nuttcp output (max of 40 characters)\n\
-F flip option to reverse direction of data connection open\n\
-a retry failed server connection \"again\" for transient errors\n"
#ifdef HAVE_SETPRIO
" -xP## set nuttcp process priority (must be root)\n"
#endif
#ifdef HAVE_SETAFFINITY
" -xc## set nuttcp client process CPU affinity\n"
" -xcs## set nuttcp server process CPU affinity\n"
" -xc#/# set nuttcp client/server process CPU affinity\n"
#endif
" -d set TCP SO_DEBUG option on data socket\n\
-v[v] verbose [or very verbose] output\n\
-b brief output (default)\n\
-br add per-stream TCP retrans info to brief summary (Linux only)\n\
-D xmit only: don't buffer TCP writes (sets TCP_NODELAY sockopt)\n\

```

```

-B recv only: only output full blocks of size from -l## (for TAR)\n"
" --packet-burst packet burst value for instantaneous rate limit option\n"
" --idle-data-timeout <value|minimum/default/maximum> (default: 15/30/60)\n"
"     client timeout in seconds for idle data connection\n"
#ifdef IPV6_V6ONLY
" --disable-v4-mapped disable v4 mapping in v6 server (default)\n"
" --enable-v4-mapped enable v4 mapping in v6 server\n"
#endif
"\n\
Usage (server): nuttcp -S[P] [-options]\n\
    note server mode excludes use of -s except for -1 one-shot mode\n\
    'P' suboption makes 3rd party {in,out} bound control ports same\n\
    -4 Use IPv4 (default)\n"
#ifdef AF_INET6
" -6 Use IPv6\n"
#endif
" -1 oneshot server mode (implied with inetd/xinetd), implies -S\n"
#if defined(linux)
" -s[d][z] use stdin/stdout for data input/output instead of pattern data\n"
"     ('d' suboption uses direct I/O if input/output is regular file)\n"
"     ('z' suboption enables zero copy tx if input is regular file)\n"
#else
" -s use stdin/stdout for data input/output instead of pattern data\n"
#endif
" -P##  port number for server connection (default 5000)\n\
    note don't use with inetd/xinetd (use services file instead)\n"
#ifdef HAVE_SETPRIO
" -xP##  set nuttcp process priority (must be root)\n"
#endif
#ifdef HAVE_SETAFFINITY
" -xc##  set nuttcp server process CPU affinity\n"
#endif
" --idle-data-timeout <value|minimum/default/maximum> (default: 15/30/60)\n"
"     server timeout in seconds for idle data connection\n"
" --no3rdparty don't allow 3rd party capability\n"
" --nofork   don't fork server\n"
" --single-threaded make manually started server be single threaded\n"
#ifdef IPV6_V6ONLY
" --disable-v4-mapped disable v4 mapping in v6 server (default)\n"
" --enable-v4-mapped enable v4 mapping in v6 server\n"
#endif
"\n\
Multilink aggregation options (TCP only):\n\
    nuttcp [-options] -N## [ctl_addr]/host1/host2/.../host## (xmit only)\n\
    nuttcp [-options] -N## [ctl_addr]/host+addr_stride (IPv4 only)\n\
    nuttcp [-options] -N## [ctl_addr]/host+n.n.n.n (IPv4 only)\n\
    nuttcp [-options] -N##m [ctl_addr]/host\n\
        where host resolves to multiple addresses\n\

```

```

\n\
    separate [ctl_addr/] option available only for xmit\n\
\n\
Format options:\n\
-fxmitstats also give transmitter stats (MB) with -i (UDP only)\n\
-frunningtotal also give cumulative stats on interval reports\n\
-f-drops don't give packet drop info on brief output (UDP)\n\
-f-retrans don't give retrans info on brief output (TCP)\n\
-f-percentloss don't give %%loss info on brief output (UDP)\n\
-fparse generate key=value parsable output\n\
-f-beta suppress beta version message\n\
-f-rtt suppress RTT info \n\
";

```

```

char stats[128];
char srvrbuf[4096];
char tmpbuf[257];
uint64_t nbytes = 0; /* bytes on net */
int64_t pbytes = 0; /* previous bytes - for interval reporting */
int64_t ntbytes = 0; /* bytes sent by transmitter */
int64_t ptbytes = 0; /* previous bytes sent by transmitter */
uint64_t ntbytesc = 0; /* bytes sent by transmitter that have
    * been counted */
uint64_t ntbytescp = 0; /* previous ntbytesc count */
uint64_t ntbytescpi = 0; /* ntbytescp for interval reports */
uint64_t chk_nbytes = 0; /* byte counter used to test if no more data
    * being received by server (presumably because
    * client transmitter went away */

double rtt = 0.0; /* RTT between client and server in ms */
uint32_t nretrans[MAXSTREAM+1]; /* number of TCP retransmissions */
uint32_t iretrans[MAXSTREAM+1]; /* initial number of TCP retransmissions */
uint32_t pretrans = 0; /* previous number of TCP retransmissions */
uint32_t sretrans = 0; /* number of system TCP retransmissions */

int numCalls = 0; /* # of NRead/NWrite calls. */
int nstream = 1; /* number of streams */
int multilink = 0; /* set to use multilink aggregation */
int stream_idx = 0; /* current stream */
int start_idx = 1; /* set to use or bypass control channel */
int b_flag = 1; /* use mread() */
int got_svr_output = 0; /* set when server output has been read */
int reading_svr_info = 0; /* set when starting to read server info */
int retry_server = 0; /* set to retry control connect() to server */
int num_connect_tries = 0; /* tracks attempted connects to server */
int single_threaded = 0; /* set to make server single threaded */
double svr_MB;
double svr_realt;

```



```

double srvr_KBps;
double srvr_Mbps;
int srvr_cpu_util;

double cput = 0.000001, realt = 0.000001; /* user, real time (seconds) */
double reald = 0.000001; /* real time delta - for interval reporting */
double pkt_delta; /* time delta between packets in ms */
double jitter; /* current jitter measurement in ms */
unsigned long long njitter; /* number of jitter measurements */
double jitter_min; /* jitter minimum */
double jitter_max; /* jitter maximum */
double jitter_avg; /* jitter average */
double jitteri; /* current jitter interval measurement in ms */
unsigned long long njitteri; /* number of jitter interval measurements */
double jitter_mini; /* jitter minimum for interval report */
double jitter_maxi; /* jitter maximum for interval report */
double jitter_avgi; /* jitter average for interval report */
double owd; /* current one-way delay measurement in ms */
unsigned long long nowd; /* number of one-way delay measurements */
double owd_min; /* one-way delay minimum */
double owd_max; /* one-way delay maximum */
double owd_avg; /* one-way delay average */
unsigned long long nowdi; /* number of OWD interval measurements */
double owd_mini; /* OWD minimum for interval report */
double owd_maxi; /* OWD maximum for interval report */
double owd_avgi; /* OWD average for interval report */

void
close_data_channels()
{
    if (fd[1] == -1) return;

    if (clientserver && client && !host3 && udp && trans) {
        /* If all the EOD packets get lost at the end of a UDP
         * transfer, having the client do a shutdown() for writing
         * on the control connection allows the server to more
         * quickly realize that the UDP transfer has completed
         * (mostly of benefit for separate control and data paths)
         *
         * Can't do this in the opposite direction since the
         * server needs to send info back to client */
        shutdown(0, SHUT_WR);
    }

    if (multicast && !trans) {
        /* Leave the multicast group */
        if ((af == AF_INET) && !ssm) {
            if (setsockopt(fd[1], IPPROTO_IP, IP_DROP_MEMBERSHIP,

```

```

        (void *)&mc_group,
        sizeof(mc_group)) < 0) {
    err("setsockopt: IP_DROP_MEMBERSHIP");
}
}
#endif AF_INET6
else if ((af == AF_INET6) && !ssm) {
    if (setsockopt(fd[1], IPPROTO_IPV6, IPV6_LEAVE_GROUP,
        (void *)&mc6_group,
        sizeof(mc6_group)) < 0) {
        err("setsockopt: IPV6_LEAVE_GROUP");
    }
}
#endif
#ifdef MCAST_JOIN_SOURCE_GROUP
else if ((af == AF_INET) && ssm) {
    /* Leave the source specific multicast group */
    if (setsockopt(fd[1], IPPROTO_IP,
        MCAST_LEAVE_SOURCE_GROUP,
        &group_source_req,
        sizeof(group_source_req)) < 0) {
        err("setsockopt: MCAST_LEAVE_SOURCE_GROUP");
    }
}
#endif AF_INET6
else if ((af == AF_INET6) && ssm) {
    /* Leave the source specific multicast group */
    if (setsockopt(fd[1], IPPROTO_IPV6,
        MCAST_LEAVE_SOURCE_GROUP,
        &group_source_req,
        sizeof(group_source_req)) < 0) {
        err("setsockopt: MCAST_LEAVE_SOURCE_GROUP");
    }
}
#endif /* AF_INET6 */
#endif /* MCAST_JOIN_SOURCE_GROUP */
}

for ( stream_idx = 1; stream_idx <= nstream; stream_idx++ ) {
    close(fd[stream_idx]);
    fd[stream_idx] = -1;
}
}

#ifdef SIGPIPE
void
sigpipe( int signum )
{

```

```

    signal(SIGPIPE, sigpipe);
}
#endif

void
sigint( int signum )
{
    signal(SIGINT, SIG_DFL);
    fputs("\n*** transfer interrupted ***\n", stdout);
    if (clientserver && client && !host3 && udp && !trans)
        shutdown(0, SHUT_WR);
    else
        intr = 1;
    done++;
    return;
}

void
ignore_alarm( int signum )
{
    return;
}

void
sigalarm( int signum )
{
    struct timeval timec; /* Current time */
    struct timeval timed; /* Delta time */
    int64_t nrbytes;
    uint64_t deltarbytes, deltabytes;
    double fractloss;
    int nodata;
    int i;
    char *cp1, *cp2;
    short save_events;
    long flags, saveflags;

    if (host3 && clientserver) {
        if (client)
            intr = 1;
        return;
    }

    if (clientserver && client && reading_srvr_info) {
        mes("Error: not receiving server info");
        exit(1);
    }
}

```

```

if (interval && !trans) {
    /* Get real time */
    gettimeofday(&timec, (struct timezone *)0);
    tvsub( &timed, &timec, &timep );
    realtd = timed.tv_sec + ((double)timed.tv_usec) / 1000000;
    if (realtd <= 0.0) realtd = 0.000001;
    tvsub( &timed, &timec, &time0 );
    realt = timed.tv_sec + ((double)timed.tv_usec)
        / 1000000;
    if (realt <= 0.0) realt = 0.000001;
}

if (clientserver && !trans) {
    struct sockaddr_in peer;
    socklen_t peerlen = sizeof(peer);

    nodata = 0;

    if (getpeername(fd[0], (struct sockaddr *)&peer, &peerlen) < 0)
        nodata = 1;

    if (!client && udp && got_begin) {
        /* checks if client did a shutdown() for writing
        * on the control connection */
        pollfds[0].fd = fileno(ctlconn);
        save_events = pollfds[0].events;
        pollfds[0].events = POLLIN | POLLPRI;
        pollfds[0].revents = 0;
        if ((poll(pollfds, 1, 0) > 0) &&
            (pollfds[0].revents & (POLLIN | POLLPRI))) {
            nodata = 1;
        }
        pollfds[0].events = save_events;
    }

    if (interval) {
        chk_interval += realtd;
        if (chk_interval >= chk_idle_data) {
            chk_interval = 0;
            if ((nbytes - chk_nbytes) == 0)
                nodata = 1;
            chk_nbytes = nbytes;
        }
    }
    else {
        if ((nbytes - chk_nbytes) == 0)
            nodata = 1;
        chk_nbytes = nbytes;
    }
}

```

```

}

if (nodata) {
    /* Don't just exit anymore so can get partial results
     * (shouldn't be a problem but keep an eye out that
     * servers don't start hanging again) */
    if (!client && udp && !interval && handle_urg) {
        /* send 'A' for ABORT as urgent TCP data
         * on control connection (don't block)
         *
         * Only server can do this since client
         * does a shutdown() for writing on the
         * control connection */
        saveflags = fcntl(fd[0], F_GETFL, 0);
        if (saveflags != -1) {
            flags = saveflags | O_NONBLOCK;
            fcntl(fd[0], F_SETFL, flags);
        }
        send(fd[0], "A", 1, MSG_OOB);
        if (saveflags != -1) {
            flags = saveflags;
            fcntl(fd[0], F_SETFL, flags);
        }
    }
    if (client) {
        mes("Error: not receiving data from server");
        exit(1);
    }
    close_data_channels();
    intr = 1;
    return;
}

if (!interval)
    return;
}

if (interval && !trans) {
    if ((udp && !got_begin) || done) {
        timep.tv_sec = timec.tv_sec;
        timep.tv_usec = timec.tv_usec;
        return;
    }
    if (clientserver) {
        nabytes = nbytes;
        if (udplossinfo) {
            nabytes = *(int64_t *) (buf + 24);
            if (need_swap) {

```

```

    cp1 = (char *)&ntbytes;
    cp2 = buf + 31;
    for ( i = 0; i < 8; i++ )
        *cp1++ = *cp2--;
}
if (ntbytes > ntbytesc)
    /* received bytes not counted yet */
    nrbytes += buflen;
if ((nrbytes > ntbytes) ||
    ((nrbytes - pbytes) > (ntbytes - ptbytes)))
    /* yes they were counted */
    nrbytes -= buflen;
}
if (read_retrans) {
    nretrans[1] = *(uint32_t*)(buf + 24);
    if (need_swap) {
        cp1 = (char *)&nretrans[1];
        cp2 = buf + 27;
        for ( i = 0; i < 4; i++ )
            *cp1++ = *cp2--;
    }
}
if (*ident)
    fprintf(stdout, "%s: ", ident + 1);
if (format & PARSE)
    strcpy(fmt, P_PERF_FMT_INTERVAL);
else
    strcpy(fmt, PERF_FMT_INTERVAL);
fprintf(stdout, fmt,
        (double)(nrbytes - pbytes)/(1024*1024), reald,
        (double)(nrbytes - pbytes)/reald/125000);
if (udplossinfo) {
    if (!(format & NODROPS)) {
        if (format & PARSE)
            strcpy(fmt,
                P_DROP_FMT_INTERVAL);
        else
            strcpy(fmt, DROP_FMT_INTERVAL);
        fprintf(stdout, fmt,
            ((ntbytes - ptbytes)
             - (nrbytes - pbytes))
            /buflen,
            (ntbytes - ptbytes)/buflen);
    }
    if (!(format & NOPERCENTLOSS)) {
        deltarbytes = nrbytes - pbytes;
        deltatbytes = ntbytes - ptbytes;
        fractloss = (deltatbytes ?

```

```

1.0 -
    (double)deltarbytes
    /(double)deltatbytes :
0.0);
if (format & PARSE)
    strcpy(fmt,
        P_LOSS_FMT_INTERVAL);
else if ((fractloss != 0.0) &&
    (fractloss < 0.001))
    strcpy(fmt,
        LOSS_FMT_INTERVAL5);
else
    strcpy(fmt, LOSS_FMT_INTERVAL);
fprintf(stdout, fmt, fractloss * 100);
}
}
if ((do_jitter & JITTER_MIN) && njitteri) {
    if (format & PARSE)
        strcpy(fmt, P_JITTER_MIN_FMT_INTERVAL);
    else
        strcpy(fmt, JITTER_MIN_FMT_INTERVAL);
    fprintf(stdout, fmt, jitter_mini);
}
if ((do_jitter & JITTER_AVG) && njitteri) {
    if (format & PARSE)
        strcpy(fmt, P_JITTER_AVG_FMT_INTERVAL);
    else
        strcpy(fmt, JITTER_AVG_FMT_INTERVAL);
    fprintf(stdout, fmt, jitter_avgi/njitteri);
}
if ((do_jitter & JITTER_MAX) && njitteri) {
    if (format & PARSE)
        strcpy(fmt, P_JITTER_MAX_FMT_INTERVAL);
    else
        strcpy(fmt, JITTER_MAX_FMT_INTERVAL);
    fprintf(stdout, fmt, jitter_maxi);
}
if (do_jitter && njitteri) {
    njitteri = 0;
    jitter_mini = 1000000.0;
    jitter_maxi = -1000000.0;
    jitter_avgi = 0.0;
}
if (read_retrans && sinkmode) {
    if (format & PARSE)
        fprintf(stdout, P_RETRANS_FMT_INTERVAL,
            ((retransinfo == 1) ||
            !nrbytes) ? "" : "host-",

```

```

        (nretrans[1] - pretrans));
    else
        fprintf(stdout, RETRANS_FMT_INTERVAL,
            (nretrans[1] - pretrans),
            ((retransinfo == 1) ||
            !nrbytes) ? "" : "host-");
    }
if ((do_owd & OWD_MIN) && nowdi) {
    if (format & PARSE)
        strcpy(fmt, P_OWD_MIN_FMT_INTERVAL);
    else
        strcpy(fmt, OWD_MIN_FMT_INTERVAL);
    fprintf(stdout, fmt, owd_mini);
}
if ((do_owd & OWD_AVG) && nowdi) {
    if (format & PARSE)
        strcpy(fmt, P_OWD_AVG_FMT_INTERVAL);
    else
        strcpy(fmt, OWD_AVG_FMT_INTERVAL);
    fprintf(stdout, fmt, owd_avgi/nowdi);
}
if ((do_owd & OWD_MAX) && nowdi) {
    if (format & PARSE)
        strcpy(fmt, P_OWD_MAX_FMT_INTERVAL);
    else
        strcpy(fmt, OWD_MAX_FMT_INTERVAL);
    fprintf(stdout, fmt, owd_maxi);
}
if (do_owd && nowdi) {
    nowdi = 0;
    owd_mini = 1000000.0;
    owd_maxi = -1000000.0;
    owd_avgi = 0.0;
}
if (format & RUNNINGTOTAL) {
    if (format & PARSE)
        strcpy(fmt, P_PERF_FMT_INTERVAL2);
    else
        strcpy(fmt, PERF_FMT_INTERVAL2);
    fprintf(stdout, fmt,
        (double)nrbytes/(1024*1024), realt,
        (double)nrbytes/realt/125000);
    if (udplossinfo) {
        if (!(format & NODROPS)) {
            if (format & PARSE)
                strcpy(fmt,
                    P_DROP_FMT_INTERVAL);
            else

```



```

        strcpy(fmt,
            DROP_FMT_INTERVAL);
    fprintf(stdout, fmt,
        (ntbytes - nrbytes)
        /buflen,
        ntbytes/buflen);
}
if (!(format & NOPERCENTLOSS)) {
    fractloss = (ntbytes ?
        1.0 -
            (double)nrbytes
            /((double)ntbytes :
        0.0);
    if (format & PARSE)
        strcpy(fmt,
            P_LOSS_FMT_INTERVAL);
    else if ((fractloss != 0.0) &&
        (fractloss < 0.001))
        strcpy(fmt,
            LOSS_FMT_INTERVAL5);
    else
        strcpy(fmt,
            LOSS_FMT_INTERVAL);
    fprintf(stdout, fmt,
        fractloss * 100);
}
}
if (read_retrans && sinkmode) {
    if (format & PARSE)
        fprintf(stdout,
            P_RETRANS_FMT_INTERVAL,
            ((retransinfo == 1) ||
            !nrbytes) ?
            "" : "host-",
            nretrans[1]);
    else
        fprintf(stdout,
            RETRANS_FMT_INTERVAL,
            nretrans[1],
            ((retransinfo == 1) ||
            !nrbytes) ?
            "" : "host-");
}
}
if (udplossinfo && (format & XMITSTATS)) {
    if (format & PARSE)
        strcpy(fmt, P_PERF_FMT_INTERVAL3);
    else

```

```

        strcpy(fmt, PERF_FMT_INTERVAL3);
    fprintf(stdout, fmt,
        (double)(ntbytes - ptbytes)/1024/1024);
    if (format & RUNNINGTOTAL) {
        if (format & PARSE)
            strcpy(fmt,
                P_PERF_FMT_INTERVAL4);
        else
            strcpy(fmt, PERF_FMT_INTERVAL4);
        fprintf(stdout, fmt,
            (double)ntbytes/1024/1024);
        if (format & DEBUGINTERVAL)
            fprintf(stdout, " Pre: %.4f MB",
                (double)ntbytesc
                    /1024/1024);
    }
}
fprintf(stdout, "\n");
fflush(stdout);
timep.tv_sec = timec.tv_sec;
timep.tv_usec = timec.tv_usec;
pbytes = nrbytes;
ptbytes = ntbytes;
pretrans = nretrans[1];
}
}
else
    intr = 1;
return;
}

```

```

int
main( int argc, char **argv )
{
    double MB;
    double rate_opt;
    double fractloss;
    int cpu_util;
    int first_read;
    int first_jitter, first_jitteri;
    int ocorrection = 0;
    double correction = 0.0;
    int pollst = 0;
    int i = 0, j = 0;
    char *cp1 = NULL, *cp2 = NULL, *cp3 = NULL;
    char *hostaddr;
    char ch = '\0';
    int error_num = 0;

```

```

int sockopterr = 0;
int save_errno;
struct servent *sp = 0;
struct addrinfo hints, *res[MAXSTREAM + 1] = { NULL },
    *host3res, *mcrec = NULL;
union sockaddr_union client_ipaddr;
struct sockaddr_storage dummy;
struct timeval time_eod; /* time EOD packet was received */
struct timeval time_eod0; /* time EOD0 packet was received */
struct timeval timed; /* time delta */
struct timeval timeconn1; /* time before connect() for RTT */
struct timeval timeconn2; /* time after connect() for RTT */
struct timeval timeconn; /* time to connect() == RTT */
union {
    unsigned char buf[sizeof(struct in_addr)];
    uint32_t ip32;
} ipad_stride; /* IPv4 address stride */
short save_events;
int skiparg;
int reqval;
int got_srvr_retrans;
uint32_t total_retrans = 0;
double idle_data_min = IDLE_DATA_MIN;
double idle_data_max = IDLE_DATA_MAX;
double default_idle_data = DEFAULT_IDLE_DATA;
char multsrc[ADDRSTRLEN] = "\0";
char multaddr[ADDRSTRLEN] = "\0";
long flags;
int nameinfo_flags;
int implicit_hostaddr;

sendwin = 0;
rcvwin = 0;
svrwin = -1;
format |= WANTRTT;

if (argc < 2) goto usage;

nut_cmd = argv[0];
argv++; argc--;
while (argc > 0 && argv[0][0] == '-') {
    skiparg = 0;
    switch (argv[0][1]) {

    case '4':
        domain = PF_INET;
        af = AF_INET;
        explicitaf = 1;

```

```

        break;
#ifdef AF_INET6
    case '6':
        domain = PF_INET6;
        af = AF_INET6;
        explicitaf = 1;
        break;
#endif
    case 'B':
        b_flag = 1;
        break;
    case 't':
        trans = 1;
        break;
    case 'r':
        trans = 0;
        break;
    case 'd':
        options |= SO_DEBUG;
        break;
    case 'D':
        nodelay = 1;
        break;
    case 'n':
        reqval = 0;
        if (argv[0][2] == 'b') {
            fprintf(stderr, "option \"-nb\" no longer supported, use \"-n###[k|m|g|t|p]\" instead\n");
            fflush(stderr);
            exit(1);
        }
        cp1 = getoptvalp(argv, 2, reqval, &skiparg);
        nbuf = strtoull(cp1, NULL, 0);
        if (nbuf == 0) {
            if (errno == EINVAL) {
                fprintf(stderr, "invalid nbuf = %s\n",
                    &argv[0][2]);
                fflush(stderr);
                exit(1);
            }
            else {
                nbuf = DEFAULT_NBUF;
                break;
            }
        }
        if (*cp1)
            ch = *(cp1 + strlen(cp1) - 1);
        else
            ch = '\0';

```

```

if ((ch == 'b') || (ch == 'B'))
    nbuf_bytes = 1;
else if ((ch == 'k') || (ch == 'K')) {
    nbuf *= 1024;
    nbuf_bytes = 1;
}
else if ((ch == 'm') || (ch == 'M')) {
    nbuf *= 1048576;
    nbuf_bytes = 1;
}
else if ((ch == 'g') || (ch == 'G')) {
    nbuf *= 1073741824;
    nbuf_bytes = 1;
}
else if ((ch == 't') || (ch == 'T')) {
    nbuf *= 1099511627776ull;
    nbuf_bytes = 1;
}
else if ((ch == 'p') || (ch == 'P')) {
    nbuf *= 1125899906842624ull;
    nbuf_bytes = 1;
}
break;
case 'l':
    reqval = 1;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    buflen = atoi(cp1);
    buflenopt = 1;
    if (buflen < 1) {
        fprintf(stderr, "invalid buflen = %d\n", buflen);
        fflush(stderr);
        exit(1);
    }
    if (*cp1)
        ch = *(cp1 + strlen(cp1) - 1);
    else
        ch = '\0';
    if ((ch == 'k') || (ch == 'K'))
        buflen *= 1024;
    else if ((ch == 'm') || (ch == 'M'))
        buflen *= 1048576;
    break;
case 'w':
    reqval = 1;
    if (argv[0][2] == 's') {
        cp1 = getoptvalp(argv, 3, reqval, &skiparg);
        srwrwin = atoi(cp1);
        if (*cp1)

```

```

        ch = *(cp1 + strlen(cp1) - 1);
    else
        ch = '\0';
    if ((ch == 'k') || (ch == 'K'))
        srwrwin *= 1024;
    else if ((ch == 'm') || (ch == 'M'))
        srwrwin *= 1048576;
    else if ((ch == 'g') || (ch == 'G'))
        srwrwin *= 1073741824;
    else if ((ch != 'b') && (ch != 'B'))
        srwrwin *= 1024;
    if (srwrwin < 0) {
        fprintf(stderr, "invalid srwrwin = %d\n", srwrwin);
        fflush(stderr);
        exit(1);
    }
}
else {
    if (argv[0][2] == 'b') {
        braindead = 1;
        cp1 = getoptvalp(argv, 3, reqval,
            &skiparg);
        if (*cp1 == '\0')
            break;
        sendwin = atoi(cp1);
    }
    else {
        cp1 = getoptvalp(argv, 2, reqval,
            &skiparg);
        sendwin = atoi(cp1);
    }

    if (*cp1)
        ch = *(cp1 + strlen(cp1) - 1);
    else
        ch = '\0';
    if ((ch == 'k') || (ch == 'K'))
        sendwin *= 1024;
    else if ((ch == 'm') || (ch == 'M'))
        sendwin *= 1048576;
    else if ((ch == 'g') || (ch == 'G'))
        sendwin *= 1073741824;
    else if ((ch != 'b') && (ch != 'B'))
        sendwin *= 1024;
    rcvwin = sendwin;
    if (sendwin < 0) {
        fprintf(stderr, "invalid sendwin = %d\n", sendwin);
        fflush(stderr);
    }
}

```

```

        exit(1);
    }
}
if (srvrwin == -1) {
    srvrwin = sendwin;
}
break;
case 's':
    sinkmode = 0; /* sink/source data */
#ifdef linux
    if (strchr(argv[0], 'z'))
        zerocopy = 1;
    if (strchr(argv[0], 'd'))
        directio = 1;
#endif
    break;
case 'p':
    reqval = 1;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    if ((cp2 = strchr(cp1, ':')) {
        tmpport = atoi(cp1);
        if ((tmpport < 1024) || (tmpport > 65535)) {
            fprintf(stderr,
                "invalid source port = %d\n",
                tmpport);
            fflush(stderr);
            exit(1);
        }
        srcport = tmpport;
        cp1 = cp2 + 1;
    }
    tmpport = atoi(cp1);
    if ((tmpport < 1024) || (tmpport > 65535)) {
        fprintf(stderr, "invalid port = %d\n", tmpport);
        fflush(stderr);
        exit(1);
    }
    port = tmpport;
    break;
case 'P':
    reqval = 1;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    if ((cp2 = strchr(cp1, ':')) {
        tmpport = atoi(cp1);
        if ((tmpport < 1024) || (tmpport > 65535)) {
            fprintf(stderr,
                "invalid source "
                "control port = %d\n", tmpport);

```

```

        fflush(stderr);
        exit(1);
    }
    srcctlport = tmpport;
    cp1 = cp2 + 1;
}
tmpport = atoi(cp1);
if ((tmpport < 1024) || (tmpport > 65535)) {
    fprintf(stderr,
        "invalid ctlport = %d\n", tmpport);
    fflush(stderr);
    exit(1);
}
ctlport = tmpport;
if ((cp2 = strchr(argv[0], '/')) {
    if (strchr(cp2, ':')) {
        fprintf(stderr,
            "can't specify source control "
            "port with third party\n");
        fflush(stderr);
        exit(1);
    }
    tmpport = atoi(cp2 + 1);
    if ((tmpport < 1024) || (tmpport > 65535)) {
        fprintf(stderr,
            "invalid third party "
            "ctlport = %d\n", tmpport);
        fflush(stderr);
        exit(1);
    }
    ctlport3 = tmpport;
}
break;
case 'u':
    udp = 1;
    if (!buflenopt) buflen = DEFAULTTUDPBUFLEN;
    if (argv[0][2] == 'u') {
        haverateopt = 1;
        rate = MAXRATE;
    }
    break;
case 'j':
    reqval = 0;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    if (strchr(cp1, 'm'))
        do_jitter |= JITTER_MIN;
    if (strchr(cp1, 'a'))
        do_jitter |= JITTER_AVG;

```



```

if (strchr(cp1, 'x'))
    do_jitter |= JITTER_MAX;
if (do_jitter == 0)
    do_jitter = JITTER_MAX;
if (strchr(cp1, 'o'))
    do_jitter |= JITTER_IGNORE_OOO;
udp = 1;
if (!buflenopt) buflen = DEFAULTUDPBUFLEN;
break;
case 'o':
    reqval = 0;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    if (strchr(cp1, 'm'))
        do_owd |= OWD_MIN;
    if (strchr(cp1, 'a'))
        do_owd |= OWD_AVG;
    if (strchr(cp1, 'x'))
        do_owd |= OWD_MAX;
    if (do_owd == 0)
        do_owd = OWD_AVG;
    break;
case 'v':
    brief = 0;
    if (argv[0][2] == 'v')
        verbose = 1;
    break;
case 'N':
    reqval = 1;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    nstream = atoi(cp1);
    if (strchr(cp1, 'm'))
        multilink = 1;
    if (nstream < 1) {
        fprintf(stderr, "invalid nstream = %d\n", nstream);
        fflush(stderr);
        exit(1);
    }
    if (nstream > MAXSTREAM) {
        fprintf(stderr, "nstream = %d > MAXSTREAM, set to %d\n",
            nstream, MAXSTREAM);
        nstream = MAXSTREAM;
    }
    if (nstream > 1) {
        b_flag = 1;
        send_retrans = 0;
        read_retrans = 0;
    }
    break;

```

```

case 'R':
    reqval = 1;
    haverateopt = 1;
    if (argv[0][2] == 'i') {
        cp1 = getoptvalp(argv, 3, reqval, &skiparg);
        sscanf(cp1, "%lf", &rate_opt);
        irate = 1;
    }
    else if (argv[0][2] == 'a') {
        cp1 = getoptvalp(argv, 3, reqval, &skiparg);
        sscanf(cp1, "%lf", &rate_opt);
        irate = 0;
    }
    else if (argv[0][2] == 'u') {
        rate_opt = 0.0;
        irate = 0;
        cp1 = &argv[0][3];
    }
    else {
        cp1 = getoptvalp(argv, 2, reqval, &skiparg);
        sscanf(cp1, "%lf", &rate_opt);
    }
    if ((cp2 = strchr(cp1, '/')) {
        *cp2++ = '\0';
        maxburst = atoi(cp2);
        if (maxburst <= 0) {
            fprintf(stderr,
                "invalid maxburst = %d\n",
                maxburst);
            fflush(stderr);
            exit(1);
        }
    }
    if (*cp1)
        ch = *(cp1 + strlen(cp1) - 1);
    else
        ch = '\0';
    if ((ch == 'm') || (ch == 'M'))
        rate_opt *= 1000;
    else if ((ch == 'g') || (ch == 'G'))
        rate_opt *= 1000000;
    else if (ch == 'p') {
        rate_pps = 1;
        if (strlen(cp1) >= 2) {
            ch = *(cp1 + strlen(cp1) - 2);
            if ((ch == 'k') || (ch == 'K'))
                rate_opt *= 1000;
            if ((ch == 'm') || (ch == 'M'))

```

```

        rate_opt *= 1000000;
    }
}
rate = rate_opt;
if (rate == 0)
    rate = MAXRATE;
break;
case 'T':
    reqval = 0;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    sscanf(cp1, "%lf", &timeout);
    if (timeout < 0) {
        fprintf(stderr, "invalid timeout = %f\n", timeout);
        fflush(stderr);
        exit(1);
    }
    else if (timeout == 0.0)
        timeout = DEFAULT_TIMEOUT;
    if (*cp1)
        ch = *(cp1 + strlen(cp1) - 1);
    else
        ch = '\0';
    if ((ch == 'm') || (ch == 'M'))
        timeout *= 60.0;
    else if ((ch == 'h') || (ch == 'H'))
        timeout *= 3600.0;
    else if ((ch == 'd') || (ch == 'D'))
        timeout *= 86400.0;
    itimer.it_value.tv_sec = timeout;
    itimer.it_value.tv_usec =
        (timeout - itimer.it_value.tv_sec)*1000000;
    if (timeout && !nbuf)
        nbuf = INT_MAX;
    break;
case 'i':
    reqval = 0;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    sscanf(cp1, "%lf", &interval);
    if (interval < 0.0) {
        fprintf(stderr, "invalid interval = %f\n", interval);
        fflush(stderr);
        exit(1);
    }
    else if (interval == 0.0)
        interval = 1.0;
    if (*cp1)
        ch = *(cp1 + strlen(cp1) - 1);
    else

```

```

    ch = '\0';
    if ((ch == 'm') || (ch == 'M'))
        interval *= 60.0;
    else if ((ch == 'h') || (ch == 'H'))
        interval *= 3600.0;
    break;
case 'T':
    reqval = 1;
    ident[0] = '-';
    strncpy(&ident[1],
        getoptvalp(argv, 2, reqval, &skiparg), 40);
    ident[41] = '\0';
    break;
case 'F':
    reverse = 1;
    break;
case 'b':
    reqval = 0;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    if (*cp1) {
        if (isalpha((int)(*cp1)))
            brief = 1;
        else
            brief = atoi(cp1);
        if (strchr(cp1, 'r'))
            brief |= BRIEF_RETRANS_STREAMS;
    }
    else
        brief = 1;
    break;
case 'S':
    if (strchr(&argv[0][2], 'P'))
        pass_ctlport = 1;
    trans = 0;
    clientserver = 1;
    brief = 0;
    verbose = 1;
    break;
case 'l':
    oneshot = 1;
    trans = 0;
    clientserver = 1;
    brief = 0;
    verbose = 1;
    break;
case 'V':
    fprintf(stdout, "nuttcp-%d.%d.%d%s\n", vers_major,
        vers_minor, vers_delta,

```

```

        beta ? BETA_STR : "");
    exit(0);
case 'f':
    if (strcmp(&argv[0][2], "xmitstats") == 0)
        format |= XMITSTATS;
    else if (strcmp(&argv[0][2], "debuginterval") == 0)
        format |= DEBUGINTERVAL;
    else if (strcmp(&argv[0][2], "runningtotal") == 0)
        format |= RUNNINGTOTAL;
    else if (strcmp(&argv[0][2], "-percentloss") == 0)
        format |= NOPERCENTLOSS;
    else if (strcmp(&argv[0][2], "-drops") == 0)
        format |= NODROPS;
    else if (strcmp(&argv[0][2], "-retrans") == 0)
        format |= NORETRANS;
    else if (strcmp(&argv[0][2], "debugretrans") == 0)
        format |= DEBUGRETRANS;
    else if (strcmp(&argv[0][2], "debugpoll") == 0)
        format |= DEBUGPOLL;
    else if (strcmp(&argv[0][2], "debugmtu") == 0)
        format |= DEBUGMTU;
    else if (strcmp(&argv[0][2], "debugjitter") == 0)
        format |= DEBUGJITTER;
    else if (strcmp(&argv[0][2], "parse") == 0)
        format |= PARSE;
    else if (strcmp(&argv[0][2], "-beta") == 0)
        format |= NOBETAMSG;
    /* below is for compatibility with 6.0.x beta */
    else if (strcmp(&argv[0][2], "rtt") == 0)
        format |= WANTRTT;
    else if (strcmp(&argv[0][2], "-rtt") == 0)
        format &= ~WANTRTT;
    else {
        if (argv[0][2]) {
            fprintf(stderr, "invalid format option \"%s\"\n", &argv[0][2]);
            fflush(stderr);
            exit(1);
        }
        else {
            fprintf(stderr, "invalid null format option\n");
            fprintf(stderr, "perhaps the \"-F\" flip option was intended\n");
            fflush(stderr);
            exit(1);
        }
    }
    break;
case 'x':
    reqval = 1;

```

```

    if (argv[0][2] == 't') {
        traceroute = 1;
        brief = 1;
    }
#ifdef HAVE_SETPRIO
    else if (argv[0][2] == 'P') {
        priority = atoi(getoptvalp(argv, 3, reqval,
            &skiparg));
    }
#endif
#ifdef HAVE_SETAFFINITY
    else if (argv[0][2] == 'c') {
        reqval = 1;
        if (argv[0][3] == 's') {
            cp1 = getoptvalp(argv, 4, reqval,
                &skiparg);
            srvr_affinity = atoi(cp1);
            if (srvr_affinity < 0) {
                fprintf(stderr,
                    "invalid srvr_affinity "
                    "= %d\n",
                    srvr_affinity);
                fflush(stderr);
                exit(1);
            }
        }
    }
    else {
        cp1 = getoptvalp(argv, 3, reqval,
            &skiparg);
        affinity = atoi(cp1);
        if ((affinity < 0) ||
            (affinity >= CPU_SETSIZE)) {
            fprintf(stderr,
                "invalid affinity "
                "= %d\n", affinity);
            fflush(stderr);
            exit(1);
        }
        if ((cp2 = strchr(cp1, '/')) {
            srvr_affinity = atoi(cp2 + 1);
            if (srvr_affinity < 0) {
                fprintf(stderr,
                    "invalid "
                    "srvr_affinity "
                    "= %d\n",
                    srvr_affinity);
                fflush(stderr);
                exit(1);
            }
        }
    }
}

```

```

        }
    }
}
#endif
else {
    if (argv[0][2]) {
        fprintf(stderr, "invalid x option \"%s\"\n", &argv[0][2]);
        fflush(stderr);
        exit(1);
    }
    else {
        fprintf(stderr, "invalid null x option\n");
        fflush(stderr);
        exit(1);
    }
}
break;
case '3':
    thirdparty = 1;
    break;
case 'm':
    reqval = 0;
    if (argv[0][2] == 'a') {
        ssm = 0;
        cp1 = getoptvalp(argv, 3, reqval, &skiparg);
    }
    else if (argv[0][2] == 's') {
#ifdef MCAST_JOIN_SOURCE_GROUP
        ssm = 1;
        cp1 = getoptvalp(argv, 3, reqval, &skiparg);
#else
        fprintf(stderr,
            "This system does not support SSM\n");
        fflush(stderr);
        exit(1);
#endif
    }
}
else {
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
}
if (*cp1)
    mc_param = atoi(cp1);
else
    mc_param = 1;
if ((mc_param < 1) || (mc_param > 255)) {
    fprintf(stderr, "invalid multicast ttl = %d\n", mc_param);
    fflush(stderr);
}

```

```

        exit(1);
    }
    multicast = mc_param;
    break;
case 'g':
    reqval = 1;
    mc_addr = getoptvalp(argv, 2, reqval, &skiparg);
    break;
case 'M':
    reqval = 1;
    datamss = atoi(getoptvalp(argv, 2, reqval, &skiparg));
    if (datamss < 0) {
        fprintf(stderr, "invalid datamss = %d\n", datamss);
        fflush(stderr);
        exit(1);
    }
    break;
case 'c':
    reqval = 1;
    cp1 = getoptvalp(argv, 2, reqval, &skiparg);
    tos = strtol(cp1, NULL, 0);
    if (*cp1)
        ch = *(cp1 + strlen(cp1) - 1);
    else
        ch = '\0';
    if ((ch == 'p') || (ch == 'P')) {
        /* Precedence */
        if (tos > 7) {
            fprintf(stderr, "invalid precedence = %d\n", tos);
            fflush(stderr);
            exit(1);
        }
        tos <<= 5;
    }
    else if ((ch != 't') && (ch != 'T')) {
        /* DSCP */
        if (tos > 63) {
            fprintf(stderr, "invalid dscp = %d\n", tos);
            fflush(stderr);
            exit(1);
        }
        tos <<= 2;
    }
    if (tos > 255) {
        fprintf(stderr, "invalid tos = %d\n", tos);
        fflush(stderr);
        exit(1);
    }
}

```



```

        break;
    case 'a':
        retry_server = 1;
        break;
    case '-':
        if (strcmp(&argv[0][2], "nofork") == 0) {
            nofork=1;
        }
        else if (strcmp(&argv[0][2], "no3rdparty") == 0) {
            no3rd=1;
        }
        else if (strcmp(&argv[0][2],
            "idle-data-timeout") == 0) {
            if ((cp1 = strchr(argv[1], '/')) {
                if (strchr(cp1 + 1, '/')) {
                    if (sscanf(argv[1],
                        "%lf/%lf/%lf",
                        &idle_data_min,
                        &default_idle_data,
                        &idle_data_max) != 3) {
                        fprintf(stderr, "error scanning idle-data-timeout parameter = %s\n", argv[1]);
                        fflush(stderr);
                        exit(1);
                    }
                    if (idle_data_min <= 0.0) {
                        fprintf(stderr, "invalid value for idle-data-timeout minimum = %f\n", idle_data_min);
                        fflush(stderr);
                        exit(1);
                    }
                    if (default_idle_data <= 0.0) {
                        fprintf(stderr, "invalid value for idle-data-timeout default = %f\n", default_idle_data);
                        fflush(stderr);
                        exit(1);
                    }
                    if (idle_data_max <= 0.0) {
                        fprintf(stderr, "invalid value for idle-data-timeout maximum = %f\n", idle_data_max);
                        fflush(stderr);
                        exit(1);
                    }
                    if (idle_data_max <
                        idle_data_min) {
                        fprintf(stderr, "error: idle-data-timeout maximum of %f < minimum of %f\n", idle_data_max,
idle_data_min);
                        fflush(stderr);
                        exit(1);
                    }
                }
            }
        }
        else {

```

```

        fprintf(stderr, "invalid idle-data-timeout parameter = %s\n", argv[1]);
        fflush(stderr);
        exit(1);
    }
}
else {
    sscanf(argv[1], "%lf", &idle_data_min);
    if (idle_data_min <= 0.0) {
        fprintf(stderr, "invalid value for idle-data-timeout = %f\n", idle_data_min);
        fflush(stderr);
        exit(1);
    }
    idle_data_max = idle_data_min;
    default_idle_data = idle_data_min;
}
argv++;
argc--;
}
else if (strcmp(&argv[0][2], "single-threaded") == 0) {
    single_threaded=1;
}
else if (strcmp(&argv[0][2], "packet-burst") == 0) {
    maxburst = atoi(argv[1]);
    if (maxburst <= 0) {
        fprintf(stderr,
            "invalid maxburst = %d\n",
            maxburst);
        fflush(stderr);
        exit(1);
    }
    argv++;
    argc--;
}
#ifdef IPV6_V6ONLY
    else if (strcmp(&argv[0][2], "disable-v4-mapped") == 0) {
        v4mapped=0;
    }
    else if (strcmp(&argv[0][2], "enable-v4-mapped") == 0) {
        v4mapped=1;
    }
#endif
}
else {
    goto usage;
}
break;
case 'h':
default:
    goto usage;

```

```

    }
    argv++;
    argc--;
    if (skiparg) {
        argv++;
        argc--;
    }
}

if (argc > 2) goto usage;
if (trans && (argc < 1)) goto usage;
if (clientserver && (argc != 0)) goto usage;

if (!clientserver && !trans && (argc < 1)) {
    fprintf(stderr,
        "nuttcp: Warning: Using obsolete \"classic\" mode:\n");
    fprintf(stderr,
        "        Automatically switching to "
        "oneshot server mode "
        "(\"nuttcp -1\")\n");
    oneshot = 1;
    trans = 0;
    clientserver = 1;
    brief = 0;
    verbose = 1;
}

host3 = NULL;
if (argc == 2) {
    host3 = argv[1];
    if (strlen(host3) > HOSTNAMELEN) {
        fprintf(stderr, "3rd party host '%s' too long\n", host3);
        fflush(stderr);
        exit(1);
    }
    cp1 = host3;
    while (*cp1) {
        if (!isalnum((int)(*cp1)) && (*cp1 != '-') && (*cp1 != '.')
            && (*cp1 != ':') && (*cp1 != '/')
            && (*cp1 != '+') && (*cp1 != '=')) {
            fprintf(stderr, "invalid 3rd party host '%s'\n", host3);
            fflush(stderr);
            exit(1);
        }
        cp1++;
    }
}
}

```

```

if (multicast) {
    udp = 1;
    if (!buflept) buflen = DEFAULT_MC_UDPBUFLLEN;
    nstream = 1;
}

if (mc_addr && !multicast) {
    fprintf(stderr, "can't use \"-g\" option for non-multicast\n");
    fflush(stderr);
    exit(1);
}
if (mc_addr && !*mc_addr) {
    fprintf(stderr, "no multicast IP address specified for "
        "\"-g\" option\n");
    fflush(stderr);
    exit(1);
}

#ifdef AF_INET6
if (!inet_pton(AF_INET6, HI_MC6, &hi_mc6)) {
    err("inet_pton");
}
if (!inet_pton(AF_INET6, HI_MC6_ASM, &hi_mc6_asm)) {
    err("inet_pton");
}
#endif

if (udp && !haverateopt)
    rate = DEFAULT_UDP_RATE;

bzero((char *)&frominet, sizeof(frominet));
bzero((char *)&clientaddr, sizeof(clientaddr));

#ifdef AF_INET6
bzero((char *)&clientaddr6, sizeof(clientaddr6));
clientscope6 = 0;
#endif

if (!nbuf) {
    if (timeout == 0.0) {
        if (sinkmode) {
            timeout = DEFAULT_TIMEOUT;
            itimer.it_value.tv_sec = timeout;
            itimer.it_value.tv_usec =
                (timeout - itimer.it_value.tv_sec)
                *1000000;
        }
        nbuf = INT_MAX;
    }
}

```

```

    }
}

if (srvrwin == -1) {
    srvrwin = sendwin;
}

if ((argc == 0) && !explicitaf) {
    domain = PF_INET;
    af = AF_INET;
}

if (multilink) {
    if (nstream == 1) {
        fprintf(stderr, "Warning: multilink mode not meaningful for a single stream\n");
        fflush(stderr);
    }
}

if (argc >= 1) {
    host = argv[0];
    if ((cp1 = strchr(host, '+')) {
        *cp1++ = '\0';
        if (*cp1)
            stride = cp1;
    }
    if (multilink) {
        if (stride) {
            fprintf(stderr, "don't use both multilink and address stride\n");
            fflush(stderr);
            exit(1);
        }
        if ((cp1 = strchr(host, '/')) && strchr(cp1 + 1, '/')) {
            fprintf(stderr, "multilink mode not compatible with multiple hosts %s\n", host);
            fflush(stderr);
            exit(1);
        }
    }
    hostaddr = NULL;
    implicit_hostaddr = 0;
    if ((cp1 = strchr(host, '=')) {
        *cp1++ = '\0';
        if (strchr(cp1, '/')) {
            fprintf(stderr, "host=addr format not supported for multiple control/data paths\n");
            fflush(stderr);
            exit(1);
        }
        if (*cp1) {

```

```

    if (*cp1 == '=') {
        implicit_hostaddr = 1;
        cp1++;
    }
    hostaddr = cp1;
    if (!implicit_hostaddr)
        host = hostaddr;
}
}
stream_idx = 0;
res[0] = NULL;
cp1 = host;
if (host[strlen(host) - 1] == '/') {
    fprintf(stderr, "bad hostname or address: trailing '/' not allowed: %s\n", host);
    fflush(stderr);
    exit(1);
}
if (strchr(host, '/') && !trans && !reverse) {
    fprintf(stderr, "multiple control/data paths not supported for receive\n");
    fflush(stderr);
    exit(1);
}
if (strchr(host, '/') && trans && reverse) {
    fprintf(stderr, "multiple control/data paths not supported for flipped transmit\n");
    fflush(stderr);
    exit(1);
}
if (host[0] == '/') {
    host++;
    cp1++;
    stream_idx = 1;
}
else if ((cp2 = strchr(host, '/')) {
    host = cp2 + 1;
}

while (stream_idx <= nstream) {
    bzero(&hints, sizeof(hints));
    res[stream_idx] = NULL;
    if (explicitaf) hints.ai_family = af;
    if (udp)
        hints.ai_socktype = SOCK_DGRAM;
    else
        hints.ai_socktype = SOCK_STREAM;
    if ((cp2 = strchr(cp1, '/')) {
        if (stream_idx == nstream) {
            fprintf(stderr, "bad hostname or address: too many data paths for nstream=%d: %s\n", nstream, argv[0]);
            fflush(stderr);

```

```

        exit(1);
    }
    *cp2 = '\0';
}
if (!(multilink && (stream_idx > 1)) &&
    (error_num = getaddrinfo(cp1, NULL, &hints,
        &res[stream_idx]))) {
    if (implicit_hostaddr && hostaddr) {
        if (res[stream_idx]) {
            freeaddrinfo(res[stream_idx]);
            res[stream_idx] = NULL;
        }
        error_num =
            getaddrinfo(hostaddr, NULL,
                &hints,
                &res[stream_idx]);
    }
    if (error_num) {
        if (cp2)
            *cp2++ = '/';
        if (hostaddr) {
            if (implicit_hostaddr)
                *(hostaddr - 2) = '=';
            else
                *(hostaddr - 1) = '=';
        }
        fprintf(stderr, "bad hostname or address: %s: %s\n", gai_strerror(error_num), argv[0]);
        fflush(stderr);
        exit(1);
    }
    if (implicit_hostaddr && hostaddr &&
        (stream_idx == 1)) {
        if (stride)
            *(stride - 1) = '+';
        cp3 = hostaddr;
        while (*cp3) {
            *(cp3 - 1) = *cp3;
            cp3++;
        }
        *(cp3 - 1) = '\0';
        hostaddr--;
        implicit_hostaddr = 0;
        if (stride) {
            stride--;
            *(stride - 1) = '\0';
        }
    }
}
}

```

```

else if (multilink && (stream_idx > 1)) {
    if (res[stream_idx - 1]->ai_next)
        res[stream_idx] =
            res[stream_idx - 1]->ai_next;
    else
        res[stream_idx] = res[1];
}
else if (!(multilink && (stream_idx > 1)) &&
    implicit_hostaddr && hostaddr) {
    if (stride) {
        strcat(host, "+");
        strncat(host, stride, ADDRSTRLEN);
        *(hostaddr - 2) = '\0';
        stride = hostaddr - 1;
    }
    hostaddr = NULL;
}
af = res[stream_idx]->ai_family;
/*
 * At the moment PF_ matches AF_ but are maintained seperate and the socket
 * call is supposed to be PF_
 *
 * For now we set domain from the address family we looked up, but if these
 * ever get changed to not match some code will have to go here to find the
 * domain appropriate for the family
 */
    domain = af;
    stream_idx++;
    if (cp2) {
        *cp2++ = '/';
        cp1 = cp2;
    }
    else
        cp1 = host;
}
if (!res[0]) {
    if ((cp1 = strchr(host, '/'))
        *cp1 = '\0';
    if ((error_num = getaddrinfo(host, NULL, &hints, &res[0])) {
        if (cp1)
            *cp1++ = '/';
        fprintf(stderr, "bad hostname or address: %s: %s\n", gai_strerror(error_num), argv[0]);
        fflush(stderr);
        exit(1);
    }
    af = res[0]->ai_family;
    /* see previous comment about domain */
    domain = af;

```



```

    if (cp1)
        *cp1 = '/';
    }
    if (hostaddr) {
        host = argv[0];
        if (implicit_hostaddr)
            *(hostaddr - 2) = '=';
        else
            *(hostaddr - 1) = '=';
    }
}

ipad_stride.ip32 = 0;
if (stride) {
    if (strlen(stride) >= ADDRSTRLEN) {
        fprintf(stderr, "address stride '%s' too long\n", stride);
        fflush(stderr);
        exit(1);
    }
    if (nstream == 1) {
        fprintf(stderr, "Warning: stride %s not meaningful for a single stream\n", stride);
        fflush(stderr);
    }
    if (udp) {
        fprintf(stderr, "stride %s not valid for UDP\n",
            stride);
        fflush(stderr);
        exit(1);
    }
    if ((cp1 = strchr(argv[0], '/')) && strchr(cp1 + 1, '/')) {
        fprintf(stderr, "stride %s not compatible with multiple hosts %s\n", stride, argv[0]);
        fflush(stderr);
        exit(1);
    }
    if (af == AF_INET) {
        if (strchr(stride, '.')) {
            error_num = inet_pton(AF_INET, stride,
                ipad_stride.buf);
            if (error_num == 0) {
                fprintf(stderr,
                    "stride %s not in correct presentation format\n",
                    stride);
                fflush(stderr);
                exit(1);
            }
        }
        else if (error_num < 0)
            err("inet_pton: stride");
    }
}

```

```

else {
    ipad_stride.ip32 = atoi(stride);
    ipad_stride.ip32 = htonl(ipad_stride.ip32);
}
}
else {
    fprintf(stderr, "stride %s not valid for IPv6\n",
        stride);
    fflush(stderr);
    exit(1);
}
*(stride - 1) = '+';
}

if (host3 && !strchr(host3, '=') && !strchr(host3, '/')) {
    cp1 = strchr(host3, '+');
    if (cp1) {
        if (strlen(cp1 + 1) >= ADDRSTRLEN) {
            fprintf(stderr, "3rd party address stride '%s' too long\n", cp1 + 1);
            fflush(stderr);
            exit(1);
        }
        *cp1 = '\0';
    }
    if (inet_pton(AF_INET, host3, &dummy) != 1) {
        bzero(&hints, sizeof(hints));
        hints.ai_family = AF_INET;
        if (udp)
            hints.ai_socktype = SOCK_DGRAM;
        else
            hints.ai_socktype = SOCK_STREAM;
        host3res = NULL;
        error_num = getaddrinfo(host3, NULL, &hints, &host3res);
        if (error_num == 0) {
            nameinfo_flags = NI_NUMERICHOST;
            error_num = getnameinfo(host3res->ai_addr,
                host3res->ai_addrlen,
                host3addr, ADDRSTRLEN,
                NULL, 0,
                nameinfo_flags);
        }
        if (host3res) {
            freeaddrinfo(host3res);
            host3res = NULL;
        }
        if (error_num == 0) {
            strncpy(host3buf, host3, HOSTNAMELEN);
            strcat(host3buf, "===");
        }
    }
}

```

```

    strncat(host3buf, host3addr, ADDRSTRLEN);
    if (cp1) {
        strcat(host3buf, "+");
        strncat(host3buf, cp1 + 1, ADDRSTRLEN);
    }
    host3 = host3buf;
}
}
if (cp1)
    *cp1 = '+';
}

if (!port) {
    if (af == AF_INET) {
        if ((sp = getservbyname( "nuttcp-data", "tcp" )))
            port = ntohs(sp->s_port);
        else
            port = DEFAULT_PORT;
    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
        if ((sp = getservbyname( "nuttcp6-data", "tcp" )))
            port = ntohs(sp->s_port);
        else {
            if ((sp = getservbyname( "nuttcp-data", "tcp" )))
                port = ntohs(sp->s_port);
            else
                port = DEFAULT_PORT;
        }
    }
#endif
    else {
        err("unsupported AF");
    }
}

if (!ctlport) {
    if (af == AF_INET) {
        if ((sp = getservbyname( "nuttcp", "tcp" )))
            ctlport = ntohs(sp->s_port);
        else
            ctlport = DEFAULT_CTLPORT;
    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
        if ((sp = getservbyname( "nuttcp6", "tcp" )))
            ctlport = ntohs(sp->s_port);
        else {

```

```

        if ((sp = getservbyname( "nuttcp", "tcp" )))
            ctlport = ntohs(sp->s_port);
        else
            ctlport = DEFAULT_CTLPORT;
    }
}
#endif
else {
    err("unsupported AF");
}
}

if ((port < 1024) || ((port + nstream - 1) > 65535)) {
    fprintf(stderr, "invalid port/nstream = %d/%d\n", port, nstream);
    fflush(stderr);
    exit(1);
}

if ((ctlport >= port) && (ctlport <= (port + nstream - 1))) {
    fprintf(stderr, "ctlport = %d overlaps port/nstream = %d/%d\n", ctlport, port, nstream);
    fflush(stderr);
    exit(1);
}

if (timeout && (interval >= timeout)) {
    fprintf(stderr, "ignoring interval=%f which is greater than or equal timeout=%f\n", interval, timeout);
    fflush(stderr);
    interval = 0;
}

if (clientserver) {
    if (trans) {
        fprintf(stderr, "server mode only allowed for receiver\n");
        goto usage;
    }
    udp = 0;
    start_idx = 0;
    ident[0] = '\0';
    if (af == AF_INET) {
        union peer46 {
            struct sockaddr_in peer4;
#ifdef AF_INET6
            struct sockaddr_in6 peer6;
#endif
        } peer;
        socklen_t peerlen = sizeof(peer);
        if (getpeername(0, (struct sockaddr *)&peer, &peerlen) == 0) {
#ifdef AF_INET6

```

```

        if (peer.peer4.sin_family == AF_INET)
#else
        if ((peer.peer4.sin_family == AF_INET) ||
            (peer.peer6.sin6_family == AF_INET6))
#endif
        {
#ifdef AF_INET6
            if (!explicitaf &&
                (peer.peer6.sin6_family == AF_INET6)) {
                af = AF_INET6;
                domain = af;
                clientaddr6 = peer.peer6.sin6_addr;
                clientscope6 = peer.peer6.sin6_scope_id;
                client_ipaddr.ss.ss_family = AF_INET6;
                client_ipaddr.sin6.sin6_addr =
                    clientaddr6;
            }
            else {
                clientaddr = peer.peer4.sin_addr;
                client_ipaddr.ss.ss_family = AF_INET;
                client_ipaddr.sin.sin_addr = clientaddr;
            }
#else
            clientaddr = peer.peer4.sin_addr;
            client_ipaddr.ss.ss_family = AF_INET;
            client_ipaddr.sin.sin_addr = clientaddr;
#endif
        }
        inetd = 1;
        oneshot = 1;
        start_idx = 1;
    }
}
}
#ifdef AF_INET6
    else if (af == AF_INET6) {
        struct sockaddr_in6 peer;
        socklen_t peerlen = sizeof(peer);
        if (getpeername(0, (struct sockaddr *)&peer, &peerlen) == 0) {
            if ((peer.sin6_family == AF_INET) ||
                (peer.sin6_family == AF_INET6)) {
                clientaddr6 = peer.sin6_addr;
                clientscope6 = peer.sin6_scope_id;
                client_ipaddr.ss.ss_family = AF_INET6;
                client_ipaddr.sin6.sin6_addr = clientaddr6;
                inetd = 1;
                oneshot = 1;
                start_idx = 1;
            }
        }
    }
#endif
}
}
}

```

```

    }
}
#endif
else {
    err("unsupported AF");
}
}

if (clientserver && !inetd && !oneshot && !sinkmode) {
    fprintf(stderr, "option \"-s\" invalid with \"-S\" server mode\n");
    fprintf(stderr, "option \"-s\" can be used with \"-1\" oneshot server mode\n");
    fflush(stderr);
    exit(1);
}

#ifdef HAVE_SETPRIO
if (priority) {
    if (setpriority(PRIO_PROCESS, 0, priority) != 0)
        err("couldn't change priority");
}
#endif

#ifdef HAVE_SETAFFINITY
if ((affinity >= 0) && !host3) {
    if ((ncores = sysconf(_SC_NPROCESSORS_CONF)) <= 0)
        err("sysconf: couldn't get _SC_NPROCESSORS_CONF");
    CPU_ZERO(&cpu_set);
    CPU_SET(affinity, &cpu_set);
    if (sched_setaffinity(0, sizeof(cpu_set_t), &cpu_set) != 0)
        err("couldn't change CPU affinity");
}
#endif

if (argc >= 1) {
    start_idx = 0;
    client = 1;
    clientserver = 1;
}

if (clientserver && !client && srcctlport) {
    fprintf(stderr, "can't specify source control port in server mode\n");
    fflush(stderr);
    exit(1);
}

if (!host3 && clientserver && client && (ssm < 0)) {
    if (af == AF_INET) {
        ssm = 0;
    }
}

```

```

    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
#ifdef MCAST_JOIN_SOURCE_GROUP
        ssm = 1;
#else
        ssm = 0;
#endif
    }
#endif
}

mc_af = af;
if (!host3 && clientserver && client && mc_addr) {
    bzero(&hints, sizeof(hints));
    if (explicitaf)
        hints.ai_family = af;
    if (udp)
        hints.ai_socktype = SOCK_DGRAM;
    else
        hints.ai_socktype = SOCK_STREAM;
    mres = NULL;
    error_num = getaddrinfo(mc_addr, NULL, &hints, &mres);
    if (error_num) {
        fprintf(stderr, "getaddrinfo: "
            "bad multicast IP address: %s: %s\n",
            mc_addr, gai_strerror(error_num));
        fflush(stderr);
        exit(1);
    }
    nameinfo_flags = NI_NUMERICHOST;
    error_num = getnameinfo(mres->ai_addr, mres->ai_addrlen,
        mcgaddr, ADDRSTRLEN, NULL, 0,
        nameinfo_flags);
    if (error_num) {
        fprintf(stderr, "getnameinfo: "
            "bad multicast IP address: %s: %s\n",
            mc_addr, gai_strerror(error_num));
        fflush(stderr);
        exit(1);
    }
    mc_addr = mcgaddr;
    if (mres->ai_family == AF_INET) {
        struct sockaddr_in *group;
        struct in_addr ipv4_mcaddr;

        group = (struct sockaddr_in *)mres->ai_addr;
        bcopy((char *)&(group->sin_addr), (char *)&ipv4_mcaddr,

```

```

        sizeof(struct in_addr);
    if (ssm) {
        if (((htonl(ipv4_mcaddr.s_addr) & 0xFF000000) !=
            (HI_MC_SSM << 24))) {
            fprintf(stderr, "bad SSM multicast "
                "IP address: %s: "
                "use 232.x.y.z\n",
                mcgaddr);
            fflush(stderr);
            exit(1);
        }
    }
    else {
        if (((htonl(ipv4_mcaddr.s_addr) & 0xFF000000) !=
            (HI_MC << 24))) {
            fprintf(stderr, "bad ASM multicast "
                "IP address: %s: "
                "use 231.x.y.z\n",
                mcgaddr);
            fflush(stderr);
            exit(1);
        }
    }
}
#ifdef AF_INET6
if (mcre->ai_family == AF_INET6) {
    struct sockaddr_in6 *group;

    group = (struct sockaddr_in6 *)mcre->ai_addr;
    if (ssm) {
        if ((bcmp((char *)&(group->sin6_addr),
            (char *)&hi_mc6,
            HI_MC6_LEN - 1) != 0) ||
            (group->sin6_addr.s6_addr[HI_MC6_LEN - 1]
            < 0x80)) {
            fprintf(stderr,
                "bad SSM multicast IP address: "
                "%s: use ff3e::[8-f]xxx:yyy\n",
                mcgaddr);
            fflush(stderr);
            exit(1);
        }
    }
    else {
        if ((bcmp((char *)&(group->sin6_addr),
            (char *)&hi_mc6_asm,
            HI_MC6_ASM_LEN) != 0)) {
            fprintf(stderr,

```



```

        "bad ASM multicast IP address: "
        "%s: use ff2e::www:xxxx:"
        "yyyy:zzzz\n",
        mcgaddr);
    fflush(stderr);
    exit(1);
}
}
}
#endif
    mc_af = mcres->ai_family;
}

if (irate < 0) {
    if (do_jitter)
        irate = 1;
    else
        irate = 0;
}
if (do_jitter && (rate == MAXRATE)) {
    fprintf(stderr, "jitter option not supported for "
        "unlimited rate\n");
    fflush(stderr);
    exit(1);
}
if (do_jitter && !irate) {
    fprintf(stderr, "jitter option requires"
        " \"-Ri\" instantaneous rate limit option\n");
    fflush(stderr);
    exit(1);
}
if (interval && !clientserver) {
    fprintf(stderr, "interval option only supported for client/server mode\n");
    fflush(stderr);
    exit(1);
}
if (reverse && !clientserver) {
    fprintf(stderr, "flip option only supported for client/server mode\n");
    fflush(stderr);
    exit(1);
}
if (reverse && udp) {
    fprintf(stderr, "flip option not supported for UDP\n");
    fflush(stderr);
    exit(1);
}
if (client && !sinkmode && udp) {
    fprintf(stderr, "Warning: UDP transfers unreliable for non-sinkmode - use at own risk\n");
}

```

```

    fflush(stderr);
}
if (traceroute) {
    nstream = 1;
    if (!clientserver) {
        fprintf(stderr, "traceroute option only supported for client/server mode\n");
        fflush(stderr);
        exit(1);
    }
}
if (host3) {
    if (!clientserver) {
        fprintf(stderr, "3rd party nuttcp only supported for client/server mode\n");
        fflush(stderr);
        exit(1);
    }
}

if (udp && (buflen < 5)) {
    fprintf(stderr, "UDP buflen = %d < 5, set to 5\n", buflen);
    buflen = 5; /* send more than the sentinel size */
}

if (udp && (buflen > MAXUDPBUFLen)) {
    fprintf(stderr, "UDP buflen = %d > MAXUDPBUFLen, set to %d\n",
        buflen, MAXUDPBUFLen);
    buflen = MAXUDPBUFLen;
}

if (nbuf_bytes && !host3 && !traceroute) {
    nbuf /= buflen;
}

if ((rate != MAXRATE) && rate_pps && !host3 && !traceroute) {
    uint64_t llrate = rate;

    llrate *= ((double)buflen * 8 / 1000);
    rate = llrate;
}

if (udp && interval) {
    if (buflen >= 32)
        udplossinfo = 1;
    else
        fprintf(stderr, "Unable to print interval loss information if UDP buflen < 32\n");
}

if (udp && (do_jitter & JITTER_IGNORE_OOO)) {

```

```

    if (buflen >= 32)
        udplossinfo = 1;
    else
        fprintf(stderr, "Unable to check out of order when calculating jitter if UDP buflen < 32\n");
}

if (!udp && trans) {
    if (buflen >= 32) {
        retransinfo = 1;
        b_flag = 1;
    }
    else
        fprintf(stderr, "Unable to print retransmission information if TCP buflen < 32\n");
}

if (udp && do_owd && (buflen < 16)) {
    fprintf(stderr, "Unable to calculate one-way delay if UDP buflen < 16\n");
}

ivers = vers_major*10000 + vers_minor*100 + vers_delta;

malloysize = buflen;
if (malloysize < MINMALLOC) malloysize = MINMALLOC;
#ifdef linux
    if (directio) {
        error_num = posix_memalign((void **)&buf, sysconf(_SC_PAGESIZE),
            malloysize);
        if (error_num) {
            errno = error_num;
            err("posix_memalign");
        }
    } else
#endif
if ((buf = (char *)malloc(malloysize)) == (char *)NULL)
    err("malloc");

pattern( buf, buflen );

#ifdef SIGPIPE
    signal(SIGPIPE, sigpipe);
#endif

signal(SIGINT, sigint);

if (clientserver && client && !thirdparty &&
    beta && !(format & NOBETAMSG) && (do_jitter || do_owd)) {
    fprintf(stderr, "nuttcp-%d.%d.%d: ",
        vers_major, vers_minor, vers_delta);
}

```

```

fprintf(stderr, "Using beta vers: %s interface/output "
"subject to change\n", BETA_FEATURES);
fprintf(stderr, "          (to suppress this message "
"use \"-f-beta\")\n\n");
fflush(stderr);
}

doit:
if (!udp && trans && (format & DEBUGRETRANS)) {
    sretrans = get_retrans(-1);
    fprintf(stdout, "initial system retrans = %d\n", sretrans);
}
nretrans[0] = 0;

for ( stream_idx = 1; stream_idx <= nstream; stream_idx++ ) {
    fd[stream_idx] = -1;
    nretrans[stream_idx] = 0;
}

for ( stream_idx = start_idx; stream_idx <= nstream; stream_idx++ ) {
    if (clientserver && (stream_idx == 1)) {
        retransinfo = 0;
        if (nstream == 1) {
            send_retrans = 1;
            read_retrans = 1;
        }
        do_retrans = 0;
        got_0retrans = 0;
        if (client) {
            if (udp && !host3 && !traceroute) {
                ctlconnmss = 0;
                optlen = sizeof(ctlconnmss);
                if (getsockopt(fd[0], IPPROTO_TCP, TCP_MAXSEG, (void *)&ctlconnmss, &optlen) < 0)
                    err("get ctlconn maximum segment size didn't work");
                if (!ctlconnmss) {
                    ctlconnmss = NON_JUMBO_ETHER_MSS;
                    if (format & DEBUGMTU) {
                        fprintf(stderr, "nuttcp%s%s: Warning: Control connection MSS reported as 0, using %d\n", trans?"-
t":"-r", ident, ctlconnmss);
                        fflush(stderr);
                    }
                }
            }
            else if (format & DEBUGMTU)
                fprintf(stderr, "ctlconnmss = %d\n", ctlconnmss);
            if (buflenopt) {
                if (buflen >
                    ctlconnmss +
                    TCP_UDP_HDRLEN_DELTA +

```

```

        TCP_TIMESTAMPS_OPTLEN) {
        if (format & PARSE)
            fprintf(stderr, "nuttcp%s%s:
Warning=\`IP_frags_or_no_data_reception_since_buflen=%d >_ctlconnmss=%d\`\\n", trans?"-t":"-r", ident, buflen,
ctlconnmss);
        else
            fprintf(stderr, "nuttcp%s%s: Warning: IP frags or no data reception since buflen=%d >
ctlconnmss=%d\\n", trans?"-t":"-r", ident, buflen, ctlconnmss);
            fflush(stderr);
        }
    }
else {
    while (buflen > ctlconnmss) {
        buflen >>= 1;
        if (nbuf_bytes)
            nbuf <<= 1;
        if ((rate != MAXRATE) &&
            rate_pps)
            rate >>= 1;
    }
}
if (format & DEBUGMTU)
    fprintf(stderr, "buflen = %d\\n", buflen);
}
if (!(ctlconn = fdopen(fd[0], "w")))
    err("fdopen: ctlconn for writing");
if (!sinkmode) {
    if (trans)
        savestdin=dup(0);
    else {
        savestdout=dup(1);
        close(1);
        dup(2);
    }
}
close(0);
dup(fd[0]);
if (srvr_helo) {
    fprintf(ctlconn,
        HELO_FMT, vers_major,
        vers_minor, vers_delta);
    fflush(ctlconn);
    if (!fgets(buf, mallocsize, stdin)) {
        if ((errno == ECONNRESET) &&
            (num_connect_tries <
            MAX_CONNECT_TRIES) &&
            retry_server) {
            /* retry control

```

```

        * connection to server
        * for certain possibly
        * transient errors */
    fclose(ctlconn);
    goto doit;
}
mes("error from server");
fprintf(stderr, "server aborted connection\n");
fflush(stderr);
exit(1);
}
if (sscanf(buf, HELO_FMT,
    &rvers_major,
    &rvers_minor,
    &rvers_delta) < 3) {
    rvers_major = 0;
    rvers_minor = 0;
    rvers_delta = 0;
    srvr_helo = 0;
    while (fgets(buf, mallocsize,
        stdin)) {
        if (strncmp(buf, "KO", 2) == 0)
            break;
    }
    fclose(ctlconn);
    goto doit;
}
irvers = rvers_major*10000
    + rvers_minor*100
    + rvers_delta;
}
if (host3 && nbuf_bytes && (irvers < 50501))
    nbuf /= buflen;
if (host3 && (rate != MAXRATE) && rate_pps &&
    (irvers < 50501)) {
    uint64_t llrate = rate;

    llrate *= ((double)buflen * 8 / 1000);
    rate = llrate;
}
if (host3 && !buflenopt && (irvers >= 50302))
    buflen = 0;
fprintf(ctlconn, "buflen = %d, nbuf = %llu, win = %d, nstream = %d, rate = %lu, port = %hu, trans = %d,
braindead = %d", buflen, nbuf, srvrwin, nstream, rate, port, trans, braindead);
if (irvers >= 30200)
    fprintf(ctlconn, " , timeout = %f", timeout);
else {
    timeout_sec = timeout;

```

```

    if (itimer.it_value.tv_usec)
        timeout_sec++;
    fprintf(ctlconn, ", timeout = %ld", timeout_sec);
    if (!trans && itimer.it_value.tv_usec &&
        (brief <= 0)) {
        fprintf(stdout, "nuttcp-r%s: transmit timeout value rounded up to %ld second%s for old server\n",
            ident, timeout_sec,
            (timeout_sec == 1)?"":"s");
    }
}
fprintf(ctlconn, ", udp = %d, vers = %d.%d.%d", udp, vers_major, vers_minor, vers_delta);
if (irvers >= 30302)
    fprintf(ctlconn, ", interval = %f", interval);
else {
    if (interval) {
        fprintf(stdout, "nuttcp%s%s: interval option not supported by server version %d.%d.%d, need >=
3.3.2\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        interval = 0.0;
        abortconn = 1;
    }
}
if (irvers >= 30401)
    fprintf(ctlconn, ", reverse = %d", reverse);
else {
    if (reverse) {
        fprintf(stdout, "nuttcp%s%s: flip option not supported by server version %d.%d.%d, need >= 3.4.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        reverse = 0;
        abortconn = 1;
    }
}
if (irvers >= 30501)
    fprintf(ctlconn, ", format = %d", format);
else {
    if (format) {
        fprintf(stdout, "nuttcp%s%s: format option not supported by server version %d.%d.%d, need >=
3.5.1\n",
            trans?"-t":"-r",
            ident, rvers_major,

```

```

        rvers_minor,
        rvers_delta);
    fflush(stdout);
    format = 0;
}
}
if (irvers >= 30601) {
    fprintf(ctlconn, ", traceroute = %d", traceroute);
    if (traceroute)
        skip_data = 1;
    fprintf(ctlconn, ", irate = %d", irate);
}
else {
    if (traceroute) {
        fprintf(stdout, "nuttcp%s%s: traceroute option not supported by server version %d.%d.%d, need >=
3.6.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        traceroute = 0;
        abortconn = 1;
    }
    if (irate && !trans) {
        fprintf(stdout, "nuttcp%s%s: instantaneous rate option not supported by server version %d.%d.%d,
need >= 3.6.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        irate = 0;
    }
}
}
if (srvrwin && udp && (irvers < 30602)) {
    fprintf(stdout, "nuttcp%s%s: server version %d.%d.%d ignores UDP window parameter, need >=
3.6.2\n",
        trans?"-t":"-r",
        ident, rvers_major,
        rvers_minor,
        rvers_delta);
    fflush(stdout);
}
}
if ((irvers < 40101) && (format & PARSE)) {
    fprintf(stdout, "nuttcp%s%s: \"-fparse\" option not supported by server version %d.%d.%d, need >=
4.1.1\n",
        trans?"-t":"-r",

```



```

        ident, rvers_major,
        rvers_minor,
        rvers_delta);
fflush(stdout);
format &= ~PARSE;
abortconn = 1;
}
if (irvers >= 50001) {
    cp1 = NULL;
    if (host3 && (irvers < 70101) &&
        (cp1 = strchr(host3, '=')))
        *cp1 = '\0';
    fprintf(ctlconn, ", thirdparty = %.*s", HOST3BUFLLEN, host3 ? host3 : "_NULL_");
    if (host3) {
        skip_data = 1;
        fprintf(ctlconn, " , brief3 = %d", brief);
    }
    if (cp1)
        *cp1 = '=';
}
else {
    if (host3) {
        fprintf(stdout, "nuttcp%s%s: 3rd party nuttcp not supported by server version %d.%d.%d, need >=
5.0.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        host3 = NULL;
        abortconn = 1;
    }
}
if (host3 && !abortconn) {
    if (irvers >= 60205) {
        fprintf(ctlconn,
            " , ctlport3 = %hu",
            ctlport3);
    }
    else {
        if (ctlport3) {
            fprintf(stdout, "nuttcp%s%s: ctlport3 option not supported by server version %d.%d.%d, need >=
6.2.5\n",
                trans?"-t":"-r",
                ident,
                rvers_major,
                rvers_minor,
                rvers_delta);

```

```

        fflush(stdout);
        ctlport3 = 0;
        abortconn = 1;
    }
}
}
if (irvers >= 50101) {
    fprintf(ctlconn, " , multicast = %d", multicast);
}
else {
    if (multicast) {
        fprintf(stdout, "nuttcp%s%s: multicast not supported by server version %d.%d.%d, need >= 5.1.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        multicast = 0;
        abortconn = 1;
    }
}
if (irvers >= 60201) {
    fprintf(ctlconn, " , ssm = %d", ssm);
}
else {
    if (multicast && (ssm == 1)) {
        fprintf(stdout, "nuttcp%s%s: ssm not supported by server version %d.%d.%d, need >= 6.2.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        ssm = 0;
        abortconn = 1;
    }
}
if (irvers >= 50201) {
    fprintf(ctlconn, " , datamss = %d", datamss);
}
else {
    if (datamss && !trans) {
        fprintf(stdout, "nuttcp%s%s: mss option not supported by server version %d.%d.%d, need >=
5.2.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);

```

```

        datamss = 0;
        abortconn = 1;
    }
}
if (irvers >= 50301) {
    fprintf(ctlconn, " , tos = %X", tos);
}
else {
    if (tos && !trans) {
        fprintf(stdout, "nuttcp%s%s: tos option not supported by server version %d.%d.%d, need >= 5.3.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        tos = 0;
        abortconn = 1;
    }
}
if (irvers >= 50501) {
    fprintf(ctlconn, " , nbuf_bytes = %d", nbuf_bytes);
    fprintf(ctlconn, " , rate_pps = %d", rate_pps);
    fprintf(ctlconn, " , nodelay = %d", nodelay);
}
else {
    if (host3 && udp && nbuf_bytes) {
        fprintf(stdout, "nuttcp%s%s: Warning: \"-n\" option in bytes for third party not supported\n",
            trans?"-t":"-r", ident);
        fprintf(stdout, "      Warning: by server version %d.%d.%d, need >= 5.5.1\n",
            rvers_major,
            rvers_minor,
            rvers_delta);
        fprintf(stdout, "      Warning: third party request may not transfer\n");
        fprintf(stdout, "      Warning: desired number of bytes in some UDP cases\n");
        fflush(stdout);
        nbuf_bytes = 0;
    }
    if (host3 && udp && rate_pps) {
        fprintf(stdout, "nuttcp%s%s: Warning: \"-R\" option in pps for third party not supported\n",
            trans?"-t":"-r", ident);
        fprintf(stdout, "      Warning: by server version %d.%d.%d, need >= 5.5.1\n",
            rvers_major,
            rvers_minor,
            rvers_delta);
        fprintf(stdout, "      Warning: third party request may not produce\n");
        fprintf(stdout, "      Warning: desired pps rate in some UDP cases\n");
        fflush(stdout);
        rate_pps = 0;
    }
}

```

```

    }
    if (nodelay && !trans) {
        fprintf(stdout, "nuttcp%s%s: TCP_NODELAY opt not supported by server version %d.%d.%d, need
>= 5.5.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        nodelay = 0;
        abortconn = 1;
    }
}
if (irvers >= 60206) {
    if (host3) {
        fprintf(ctlconn,
            " , affinity = %d",
            affinity);
        fprintf(ctlconn,
            " , svr_affinity = %d",
            svr_affinity);
    }
    else {
        fprintf(ctlconn,
            " , affinity = %d",
            svr_affinity);
    }
}
else {
    if (svr_affinity >= 0) {
        fprintf(stdout, "nuttcp%s%s: affinity option not supported by server version %d.%d.%d, need >=
6.2.6\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        svr_affinity = -1;
        abortconn = 1;
    }
}
if (irvers >= 60207) {
    fprintf(ctlconn, " , maxburst = %d",
        maxburst);
}
else {
    if ((maxburst > 1) &&
        (!trans || host3)) {

```

```

        fprintf(stdout, "nuttcp%s%s: packet burst not supported by server version %d.%d.%d, need >=
6.2.7\n",
        trans?"-t":"-r",
        ident, rvers_major,
        rvers_minor,
        rvers_delta);
    fflush(stdout);
    maxburst = 1;
    abortconn = 1;
    }
}
if (irvers >= 70001) {
    fprintf(ctlconn, " , do_jitter = %d", do_jitter);
}
else {
    if (do_jitter && trans) {
        fprintf(stdout, "nuttcp%s%s: jitter not supported by server version %d.%d.%d, need >= 7.0.1\n",
        trans?"-t":"-r",
        ident, rvers_major,
        rvers_minor,
        rvers_delta);
        fflush(stdout);
        do_jitter = 0;
        abortconn = 1;
    }
    if ((do_jitter & JITTER_IGNORE_OOO) &&
        !trans && !(udp && interval)) {
        udplossinfo = 0;
        fprintf(stdout, "nuttcp%s%s: Unable to check out of order when calculating jitter\n",
        trans?"-t":"-r", ident);
        fprintf(stdout, "      due to using older server version %d.%d.%d, need >= 7.0.1\n",
        rvers_major,
        rvers_minor,
        rvers_delta);
        fflush(stdout);
    }
}
if (irvers >= 70001) {
    fprintf(ctlconn, " , do_owd = %d", do_owd);
}
else {
    if (do_owd) {
        fprintf(stdout, "nuttcp%s%s: owd not supported by server version %d.%d.%d, need >= 7.0.1\n",
        trans?"-t":"-r",
        ident, rvers_major,
        rvers_minor,
        rvers_delta);
        fflush(stdout);
    }
}

```

```

        do_owd = 0;
        abortconn = 1;
    }
}
if (irvers >= 70101) {
    fprintf(ctlconn, " , stride = %d", ipad_stride.ip32);
}
else {
    if (ipad_stride.ip32) {
        fprintf(stdout, "nuttcp%s%s: stride not supported by server version %d.%d.%d, need >= 7.1.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        ipad_stride.ip32 = 0;
        abortconn = 1;
    }
}
if (irvers >= 70101) {
    fprintf(ctlconn, " , multilink = %d", multilink);
}
else {
    if (multilink) {
        fprintf(stdout, "nuttcp%s%s: multilink not supported by server version %d.%d.%d, need >= 7.1.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        multilink = 0;
        abortconn = 1;
    }
}
if (irvers >= 70201) {
    fprintf(ctlconn, " , group = %.*s", ADDRSTRLEN, mc_addr ? mc_addr : "_NULL_");
}
else {
    if (mc_addr) {
        fprintf(stdout, "nuttcp%s%s: multicast group option not supported by server version %d.%d.%d, need
>= 7.2.1\n",
            trans?"-t":"-r",
            ident, rvers_major,
            rvers_minor,
            rvers_delta);
        fflush(stdout);
        mc_addr = NULL;
        abortconn = 1;
    }
}

```

```

    }
}
if (irvers >= 70301) {
    fprintf(ctlconn, " , srcport = %hu", srcport);
}
else {
    if (srcport &&
        ((!trans && !reverse) ||
         (trans && reverse) ||
         host3)) {
        fprintf(stdout, "nuttcp%s%s: source port option not supported by server version %d.%d.%d, need >=
7.3.1\n",
                trans?"-t":"-r",
                ident, rvers_major,
                rvers_minor,
                rvers_delta);
        fflush(stdout);
        srcport = 0;
        abortconn = 1;
    }
}
fprintf(ctlconn, "\n");
fflush(ctlconn);
if (abortconn) {
    brief = 1;
    if ((!trans && !reverse) ||
        (trans && reverse))
        skip_data = 1;
}
if (!fgets(buf, mallocsize, stdin)) {
    mes("error from server");
    fprintf(stderr, "server aborted connection\n");
    fflush(stderr);
    exit(1);
}
if (irvers < 30403)
    udplossinfo = 0;
if (irvers >= 50401) {
    two_bod = 1;
    handle_urg = 1;
}
if (udp || (buflen < 32) || (irvers < 60001)) {
    if (trans)
        send_retrans = 0;
    else
        read_retrans = 0;
}
if (strncmp(buf, "OK", 2) != 0) {

```

```

mes("error from server");
fprintf(stderr, "server ");
while (fgets(buf, mallocsize, stdin)) {
    if (strncmp(buf, "KO", 2) == 0)
        break;
    fputs(buf, stderr);
}
fflush(stderr);
exit(1);
}
if (sscanf(buf, "OK v%d.%d.%d\n", &rvers_major, &rvers_minor, &rvers_delta) < 3) {
    rvers_major = 0;
    rvers_minor = 0;
    rvers_delta = 0;
}
irvers = rvers_major*10000
        + rvers_minor*100
        + rvers_delta;
usleep(10000);
}
else {
    if (inetd) {
        ctlconn = stdin;
    }
    else {
        if (!(ctlconn = fdopen(fd[0], "r")))
            err("fdopen: ctlconn for reading");
    }
    fflush(stdout);
    if (!inetd) {
        /* manually started server */
        /* send stdout to client */
        savestdout=dup(1);
        close(1);
        dup(fd[0]);
        if (!nofork) {
            /* send stderr to client */
            close(2);
            dup(1);
        }
    }
    if (!fgets(buf, mallocsize, ctlconn)) {
        fputs("KO\n", stdout);
        mes("no nuttcp HELO message");
        fputs("KO\n", stdout);
        goto cleanup;
    }
    if (sscanf(buf, HELO_FMT, &rvers_major,

```



```

        &rvers_minor, &rvers_delta) == 3) {
    fprintf(stdout, HELO_FMT, vers_major,
        vers_minor, vers_delta);
    fflush(stdout);
    if (!fgets(buf, mallocsize, ctlconn)) {
        fputs("KO\n", stdout);
        mes("no nuttcp parameters");
        fputs("KO\n", stdout);
        goto cleanup;
    }
}
irvers = rvers_major*10000
        + rvers_minor*100
        + rvers_delta;
if (sscanf(buf, "buflen = %d, nbuf = %llu, win = %d, nstream = %d, rate = %lu, port = %hu, trans = %d,
braindead = %d, timeout = %lf, udp = %d, vers = %d.%d.%d", &nbuf, &nbuf, &sendwin, &nstream, &rate,
&port, &trans, &braindead, &timeout, &udp, &rvers_major, &rvers_minor, &rvers_delta) < 13) {
    trans = !trans;
    fputs("KO\n", stdout);
    mes("error scanning parameters");
    fprintf(stdout, "may be using older client version than server\n");
    fputs(buf, stdout);
    fputs("KO\n", stdout);
    goto cleanup;
}
irvers = rvers_major*10000
        + rvers_minor*100
        + rvers_delta;
if (irvers >= 30302)
    sscanf(strstr(buf, " interval =") + 13,
        "%lf", &interval);
else
    interval = 0.0;
if (irvers >= 30401)
    sscanf(strstr(buf, " reverse =") + 12,
        "%d", &reverse);
else
    reverse = 0;
if (irvers >= 30501)
    sscanf(strstr(buf, " format =") + 11,
        "%d", &format);
else
    format = 0;
if (irvers >= 30601) {
    sscanf(strstr(buf, " traceroute =") + 15,
        "%d", &traceroute);
    if (traceroute) {
        skip_data = 1;

```

```

        brief = 1;
    }
    sscanf(strstr(buf, ", irate =") + 10,
        "%d", &irate);
}
else {
    traceroute = 0;
    irate = 0;
}
if (irvers >= 50001) {
    sprintf(fmt, "%%%ds", HOST3BUFLLEN);
    sscanf(strstr(buf, ", thirdparty =") + 15,
        fmt, host3buf);
    host3buf[HOST3BUFLLEN] = '\0';
    if (strcmp(host3buf, "_NULL_") == 0)
        host3 = NULL;
    else
        host3 = host3buf;
    if (host3) {
        if (no3rd) {
            fputs("KO\n", stdout);
            fprintf(stdout, "doesn't allow 3rd party nuttcp\n");
            fputs("KO\n", stdout);
            goto cleanup;
        }
        cp1 = host3;
        while (*cp1) {
            if (!isalnum((int)(*cp1))
                && (*cp1 != '-')
                && (*cp1 != '.')
                && (*cp1 != ':')
                && (*cp1 != '/')
                && (*cp1 != '+')
                && (*cp1 != '=')) {
                fputs("KO\n", stdout);
                mes("invalid 3rd party host");
                fprintf(stdout, "3rd party host = '%s'\n", host3);
                fputs("KO\n", stdout);
                goto cleanup;
            }
            cp1++;
        }
        skip_data = 1;
        brief = 1;
        sscanf(strstr(buf, ", brief3 =") + 11,
            "%d", &brief3);
    }
}
}

```

```

else {
    host3 = NULL;
}
if (host3 && (irvers >= 60205)) {
    sscanf(strstr(buf, " ctlport3=") + 13,
        "%hu", &ctlport3);
}
else {
    ctlport3 = 0;
}
if (irvers >= 50101) {
    sscanf(strstr(buf, " multicast=") + 14,
        "%d", &mc_param);
}
else {
    mc_param = 0;
}
if (irvers >= 60201) {
    sscanf(strstr(buf, " ssm=") + 8,
        "%d", &ssm);
}
else {
    ssm = 0;
}
#ifdef MCAST_JOIN_SOURCE_GROUP
    if (mc_param && (ssm == 1)) {
        fputs("KO\n", stdout);
        fprintf(stdout, "server does not support ssm\n");
        fputs("KO\n", stdout);
        goto cleanup;
    }
#endif
if (irvers >= 50201) {
    sscanf(strstr(buf, " datamss=") + 12,
        "%d", &datamss);
}
else {
    datamss = 0;
}
if (irvers >= 50301) {
    sscanf(strstr(buf, " tos=") + 8,
        "%X", &tos);
}
else {
    tos = 0;
}
if (irvers >= 50501) {
    sscanf(strstr(buf, " nbuf_bytes=")

```

```

        + 15,
        "%d", &nbuf_bytes);
    sscanf(strstr(buf, ", rate_pps =") + 13,
        "%d", &rate_pps);
    sscanf(strstr(buf, ", nodelay =") + 12,
        "%d", &nodelay);
}
else {
    nbuf_bytes = 0;
    rate_pps = 0;
    nodelay = 0;
}
if (irvers >= 60206) {
    if (host3) {
        sscanf(strstr(buf,
            ", affinity =") + 13,
            "%d", &affinity);
        sscanf(strstr(buf,
            ", svr_affinity =")
            + 18,
            "%d", &svr_affinity);
    }
    else {
        sscanf(strstr(buf,
            ", affinity =") + 13,
            "%d", &svr_affinity);
    }
}
else {
    svr_affinity = -1;
}
if (irvers >= 60207) {
    sscanf(strstr(buf, ", maxburst =") + 13,
        "%d", &maxburst);
}
else {
    maxburst = 1;
}
if (irvers >= 70001) {
    sscanf(strstr(buf, ", do_jitter =") + 14,
        "%d", &do_jitter);
}
else {
    do_jitter = 0;
}
if (irvers >= 70001) {
    sscanf(strstr(buf, ", do_owd =") + 11,
        "%d", &do_owd);
}

```

```

}
else {
    do_owd = 0;
}
if (irvers >= 70101) {
    sscanf(strstr(buf, ", stride =") + 11,
           "%d", &ipad_stride.ip32);
}
else {
    ipad_stride.ip32 = 0;
}
if (irvers >= 70101) {
    sscanf(strstr(buf,
                  ", multilink =") + 14,
           "%d", &multilink);
}
else {
    multilink = 0;
}
if (irvers >= 70201) {
    sprintf(fmt, "%%%ds", ADDRSTRLEN);
    sscanf(strstr(buf, ", group =") + 10,
           fmt, mcgaddr);
    mcgaddr[ADDRSTRLEN - 1] = '\0';
    if (strcmp(mcgaddr, "_NULL_") == 0)
        mc_addr = NULL;
    else
        mc_addr = mcgaddr;
    if (mc_addr) {
        cp1 = mc_addr;
        while (*cp1) {
            if (!isxdigit((int)(*cp1))
                && (*cp1 != ':')
                && (*cp1 != ':')) {
                fputs("KO\n", stdout);
                mes("invalid multicast group");
                fprintf(stdout, "multicast group = '%s'\n", mc_addr);
                fputs("KO\n", stdout);
                goto cleanup;
            }
            cp1++;
        }
    }
}
else {
    mc_addr = NULL;
}
if (irvers >= 70301) {

```

```

        sscanf(strstr(buf,
            ", srcport =") + 12,
            "%hu", &srcport);
    }
    else {
        srcport = 0;
    }
    trans = !trans;
    if (inetd && !sinkmode) {
        fputs("KO\n", stdout);
        mes("option \"-s\" invalid with inetd server");
        fputs("KO\n", stdout);
        goto cleanup;
    }
    if (!traceroute && !host3 &&
        (nbuflen != buflen)) {
        if (nbuflen < 1) {
            fputs("KO\n", stdout);
            mes("invalid buflen");
            fprintf(stdout, "buflen = %d\n", nbuflen);
            fputs("KO\n", stdout);
            goto cleanup;
        }
        free(buf);
        malloysize = nbuflen;
        if (malloysize < MINMALLOC) malloysize = MINMALLOC;
#ifdef linux
        if (directio) {
            error_num = posix_memalign(
                (void **)&buf,
                sysconf(_SC_PAGESIZE),
                malloysize);
            if (error_num) {
                errno = error_num;
                err("posix_memalign");
            }
        }
        else
#endif
        if ((buf = (char *)malloc(malloysize)) == (char *)NULL)
            err("malloc");
        pattern( buf, nbuflen );
    }
    buflen = nbuflen;
    if (nbuf < 1) {
        fputs("KO\n", stdout);
        mes("invalid nbuf");
        fprintf(stdout, "nbuf = %llu\n", nbuf);
        fputs("KO\n", stdout);

```

```

    goto cleanup;
}
rcvwin = sendwin;
if (sendwin < 0) {
    fputs("KO\n", stdout);
    mes("invalid win");
    fprintf(stdout, "win = %d\n", sendwin);
    fputs("KO\n", stdout);
    goto cleanup;
}
if ((nstream < 1) || (nstream > MAXSTREAM)) {
    fputs("KO\n", stdout);
    mes("invalid nstream");
    fprintf(stdout, "nstream = %d\n", nstream);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (nstream > 1) {
    b_flag = 1;
    send_retrans = 0;
    read_retrans = 0;
}
if (rate == 0)
    rate = MAXRATE;
if (timeout < 0) {
    fputs("KO\n", stdout);
    mes("invalid timeout");
    fprintf(stdout, "timeout = %f\n", timeout);
    fputs("KO\n", stdout);
    goto cleanup;
}
itimer.it_value.tv_sec = timeout;
itimer.it_value.tv_usec =
    (timeout - itimer.it_value.tv_sec)
    *1000000;
if ((port < 1024) || ((port + nstream - 1) > 65535)) {
    fputs("KO\n", stdout);
    mes("invalid port/nstream");
    fprintf(stdout, "port/nstream = %hu/%d\n", port, nstream);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (srcport && (srcport < 1024)) {
    fputs("KO\n", stdout);
    mes("invalid srcport");
    fprintf(stdout, "srcport = %hu\n", srcport);
    fputs("KO\n", stdout);
    goto cleanup;
}

```

```

}
if ((ctlport >= port) && (ctlport <= (port + nstream - 1))) {
    fputs("KO\n", stdout);
    mes("ctlport overlaps port/nstream");
    fprintf(stdout, "ctlport = %hu, port/nstream = %hu/%d\n", ctlport, port, nstream);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (host3 && ctlport3 && (ctlport3 < 1024)) {
    fputs("KO\n", stdout);
    mes("invalid ctlport3");
    fprintf(stdout, "ctlport3 = %hu\n",
        ctlport3);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (interval < 0) {
    fputs("KO\n", stdout);
    mes("invalid interval");
    fprintf(stdout, "interval = %f\n", interval);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (mc_param) {
    if ((mc_param < 1) ||
        (mc_param > 255)) {
        fputs("KO\n", stdout);
        mes("invalid multicast ttl");
        fprintf(stdout, "multicast ttl = %d\n", mc_param);
        fputs("KO\n", stdout);
        goto cleanup;
    }
    udp = 1;
    nstream = 1;
    if (rate == MAXRATE)
        rate = DEFAULT_UDP_RATE;
}
multicast = mc_param;
if ((!host3 && ((ssm < 0) || (ssm > 1))) ||
    (host3 && ((ssm < -1) || (ssm > 1)))) {
    fputs("KO\n", stdout);
    mes("invalid ssm value");
    fprintf(stdout, "ssm = %d\n", ssm);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (datamss < 0) {
    fputs("KO\n", stdout);

```



```

    mes("invalid datamss");
    fprintf(stdout, "datamss = %d\n", datamss);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (tos > 255) {
    fputs("KO\n", stdout);
    mes("invalid tos");
    fprintf(stdout, "tos = %d\n", tos);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (nbuf_bytes < 0) {
    fputs("KO\n", stdout);
    mes("invalid nbuf_bytes");
    fprintf(stdout, "nbuf_bytes = %d\n",
        nbuf_bytes);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (rate_pps < 0) {
    fputs("KO\n", stdout);
    mes("invalid rate_pps");
    fprintf(stdout, "rate_pps = %d\n",
        rate_pps);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (nodelay < 0) {
    fputs("KO\n", stdout);
    mes("invalid nodelay");
    fprintf(stdout, "nodelay = %d\n",
        nodelay);
    fputs("KO\n", stdout);
    goto cleanup;
}
if ((srvr_affinity >= 0) && !host3) {
#ifdef HAVE_SETAFFINITY
    CPU_ZERO(&cpu_set);
    CPU_SET(srvr_affinity, &cpu_set);
    if (sched_setaffinity(0,
        sizeof(cpu_set_t),
        &cpu_set) != 0) {
        fputs("KO\n", stdout);
        mes("couldn't change server "
            "CPU affinity");
        fprintf(stdout,
            "srvr_affinity = %d\n",

```

```

        srvr_affinity);
        fputs("KO\n", stdout);
        goto cleanup;
    }
#else
    fputs("KO\n", stdout);
    mes("server doesn't support setting "
        "CPU affinity");
    fprintf(stdout,
        "srvr_affinity = %d\n",
        srvr_affinity);
    fputs("KO\n", stdout);
    goto cleanup;
#endif
}
if (maxburst < 1) {
    fputs("KO\n", stdout);
    mes("invalid maxburst");
    fprintf(stdout, "maxburst = %d\n",
        maxburst);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (do_jitter < 0) {
    fputs("KO\n", stdout);
    mes("invalid do_jitter");
    fprintf(stdout, "do_jitter = %d\n",
        do_jitter);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (do_jitter && !udp) {
    fputs("KO\n", stdout);
    fprintf(stdout,
        "jitter option"
        " not supported for TCP\n");
    fputs("KO\n", stdout);
    goto cleanup;
}
if (do_jitter && (!rate || (rate == MAXRATE))) {
    fputs("KO\n", stdout);
    fprintf(stdout,
        "jitter option not supported"
        " for unlimited rate\n");
    fputs("KO\n", stdout);
    goto cleanup;
}
if (do_jitter && !rate) {

```

```

    fputs("KO\n", stdout);
    fprintf(stdout,
        "jitter option requires"
        " instantaneous rate limit\n");
    fputs("KO\n", stdout);
    goto cleanup;
}
if (do_owd < 0) {
    fputs("KO\n", stdout);
    mes("invalid do_owd");
    fprintf(stdout, "do_owd = %d\n",
        do_owd);
    fputs("KO\n", stdout);
    goto cleanup;
}
if (mc_addr) {
    error_num = inet_pton(AF_INET, mc_addr,
        &dummy);
#ifdef AF_INET6
    if (error_num != 1)
        error_num = inet_pton(AF_INET6,
            mc_addr,
            &dummy);
#endif
    if (error_num != 1) {
        fputs("KO\n", stdout);
        mes("invalid multicast group");
        fprintf(stdout, "multicast group = '%s'\n",
            mc_addr);
        fputs("KO\n", stdout);
        goto cleanup;
    }
}
/* used to send server "OK" here -
 * now delay sending of server OK until
 * after successful server bind() -
 * catches data port collision */
if (udp && (interval ||
    (do_jitter & JITTER_IGNORE_OOO)) &&
    (buflen >= 32) && (irvers >= 30403))
    udplossinfo = 1;
if (irvers >= 50401) {
    two_bod = 1;
    handle_urg = 1;
}
if (udp || (buflen < 32) || (irvers < 60001)) {
    if (trans)
        send_retrans = 0;

```

```

        else
            read_retrans = 0;
    }
}
}

if (clientserver && client && (stream_idx == 1)) {
    reading_srvr_info = 1;
    pollfds[0].fd = fileno(ctlconn);
    pollfds[0].events = POLLIN | POLLPRI;
    pollfds[0].revents = 0;
    flags = fcntl(0, F_GETFL, 0);
    if (flags < 0)
        err("fcntl 1");
    flags |= O_NONBLOCK;
    if (fcntl(0, F_SETFL, flags) < 0)
        err("fcntl 2");
    itimer.it_value.tv_sec = SRVR_INFO_TIMEOUT;
    itimer.it_value.tv_usec = 0;
    itimer.it_interval.tv_sec = 0;
    itimer.it_interval.tv_usec = 0;
    setitimer(ITIMER_REAL, &itimer, 0);
}

if (clientserver && client && (stream_idx == 1) &&
    ((pollst = poll(pollfds, 1, 0)) > 0) &&
    (pollfds[0].revents & (POLLIN | POLLPRI)) && !got_done) {
    /* check for server output (mainly for server error) */
    while (fgets(intervalbuf, sizeof(intervalbuf), stdin)) {
        setitimer(ITIMER_REAL, &itimer, 0);
        if (strcmp(intervalbuf, "DONE", 4) == 0) {
            if (format & DEBUGPOLL) {
                fprintf(stdout, "got DONE\n");
                fflush(stdout);
            }
            got_done = 1;
            intr = 1;
            break;
        }
    }
    else if (strcmp(intervalbuf,
        "nuttcp-", 7) == 0) {
        if ((brief <= 0) ||
            strstr(intervalbuf, "Warning") ||
            strstr(intervalbuf, "Error") ||
            strstr(intervalbuf, "Debug")) {
            if (*ident) {
                fputs("nuttcp", stdout);
                fputs(trans ?
                    "-r" : "-t",

```

```

        stdout);
        fputs(ident, stdout);
        fputs(intervalbuf + 8,
              stdout);
    }
    else
        fputs(intervalbuf,
              stdout);
    fflush(stdout);
}
if (strstr(intervalbuf, "Error"))
    exit(1);
}
else {
    if (*ident)
        fprintf(stdout, "%s: ",
              ident + 1);
    fputs(intervalbuf, stdout);
    fflush(stdout);
}
}
}
if (clientserver && client && (stream_idx == 1)) {
    reading_srvr_info = 0;
    flags = fcntl(0, F_GETFL, 0);
    if (flags < 0)
        err("fcntl 1");
    flags &= ~O_NONBLOCK;
    if (fcntl(0, F_SETFL, flags) < 0)
        err("fcntl 2");
    itimer.it_value.tv_sec = 0;
    itimer.it_value.tv_usec = 0;
    setitimer(ITIMER_REAL, &itimer, 0);
}

if (!client) {
    if (af == AF_INET) {
        inet_ntop(af, &clientaddr.s_addr, hostbuf, sizeof(hostbuf));
    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
        inet_ntop(af, clientaddr6.s6_addr, hostbuf, sizeof(hostbuf));
    }
#endif
    host = hostbuf;
}

if (multilink && !client &&

```

```

((trans && !reverse) || (!trans && reverse)) &&
!udp && (stream_idx == 1)) {
nameinfo_flags = NI_NAMEREQD;
if (getnameinfo((struct sockaddr *)&client_ipaddr,
    sizeof(struct in6_addr),
    clientbuf, NI_MAXHOST,
    NULL, 0,
    nameinfo_flags) == 0) {
bzero(&hints, sizeof(hints));
res[0] = NULL;
res[1] = NULL;
hints.ai_family = af;
if (udp)
    hints.ai_socktype = SOCK_DGRAM;
else
    hints.ai_socktype = SOCK_STREAM;
if (getaddrinfo(clientbuf, NULL, &hints,
    &res[1]) == 0) {
for ( i = 2; i <= nstream; i++ ) {
    if (res[i - 1]->ai_next)
        res[i] =
            res[i - 1]->ai_next;
    else
        res[i] = res[1];
}
}
else {
    if (res[1]) {
        freeaddrinfo(res[1]);
        res[1] = NULL;
    }
    multilink = 0;
}
}
else
    multilink = 0;
}

if ((stream_idx > 0) && skip_data) {
if (clientserver && !client && (stream_idx == 1)) {
    /* send server "OK" message */
    fprintf(stdout, "OK v%d.%d.%d\n", vers_major,
        vers_minor, vers_delta);
    fflush(stdout);
}
break;
}
}

```

```

        bzero((char *)&sinme[stream_idx], sizeof(sinme[stream_idx]));
        bzero((char *)&sinhim[stream_idx], sizeof(sinhim[stream_idx]));

#ifdef AF_INET6
        bzero((char *)&sinme6[stream_idx], sizeof(sinme6[stream_idx]));
        bzero((char *)&sinhim6[stream_idx], sizeof(sinhim6[stream_idx]));
#endif

if (((trans && !reverse) && (stream_idx > 0)) ||
    ((!trans && reverse) && (stream_idx > 0)) ||
    (client && (stream_idx == 0))) {
    /* xmitr initiates connections (unless reversed) */
    if (client) {
        if (af == AF_INET) {
            sinhim[stream_idx].sin_family = af;
            if (ipad_stride.ip32 && (stream_idx > 1)) {
                sinhim[stream_idx].sin_addr.s_addr =
                    sinhim[stream_idx - 1].sin_addr.s_addr
                    + ipad_stride.ip32;
            }
            else {
                bcopy((char *)&(((struct sockaddr_in *)res[stream_idx]->ai_addr)->sin_addr),
                    (char *)&sinhim[stream_idx].sin_addr.s_addr,
                    sizeof(sinhim[stream_idx].sin_addr.s_addr));
            }
        }
#ifdef AF_INET6
        else if (af == AF_INET6) {
            sinhim6[stream_idx].sin6_family = af;
            bcopy((char *)&(((struct sockaddr_in6 *)res[stream_idx]->ai_addr)->sin6_addr),
                (char *)&sinhim6[stream_idx].sin6_addr.s6_addr,
                sizeof(sinhim6[stream_idx].sin6_addr.s6_addr));
            sinhim6[stream_idx].sin6_scope_id = ((struct sockaddr_in6 *)res[stream_idx]->ai_addr)-
>sin6_scope_id;
        }
#endif
    }
}

#ifdef AF_INET6
    else if (af == AF_INET6) {
        err("unsupported AF");
    }
} else {
    sinhim[stream_idx].sin_family = af;
    if (ipad_stride.ip32 && (stream_idx > 1)) {
        sinhim[stream_idx].sin_addr.s_addr =
            sinhim[stream_idx - 1].sin_addr.s_addr
            + ipad_stride.ip32;
    }
    else {
        if (multilink && (stream_idx > 0))

```

```

        sinhim[stream_idx].sin_addr =
            ((struct sockaddr_in *)res[stream_idx]->ai_addr)->sin_addr;
    else
        sinhim[stream_idx].sin_addr =
            clientaddr;
    }
#ifdef AF_INET6
    sinhim6[stream_idx].sin6_family = af;
    if (multilink && (stream_idx > 0))
        sinhim6[stream_idx].sin6_addr =
            ((struct sockaddr_in6 *)res[stream_idx]->ai_addr)->sin6_addr;
    else
        sinhim6[stream_idx].sin6_addr =
            clientaddr6;
    sinhim6[stream_idx].sin6_scope_id = clientscope6;
#endif
}
if (stream_idx == 0) {
    sinhim[stream_idx].sin_port = htons(ctlport);
    sinme[stream_idx].sin_port = htons(srcctlport); /* default is free choice */
#ifdef AF_INET6
    sinhim6[stream_idx].sin6_port = htons(ctlport);
    sinme6[stream_idx].sin6_port = htons(srcctlport); /* default is free choice */
#endif
} else {
    sinhim[stream_idx].sin_port = htons(port + stream_idx - 1);
    sinme[stream_idx].sin_port = htons(srcport); /* default is free choice */
#ifdef AF_INET6
    sinhim6[stream_idx].sin6_port = htons(port + stream_idx - 1);
    sinme6[stream_idx].sin6_port = htons(srcport); /* default is free choice */
#endif
}
} else {
    /* rcvr listens for connections (unless reversed) */
    if (stream_idx == 0) {
        sinme[stream_idx].sin_port = htons(ctlport);
        sinhim[stream_idx].sin_port = htons(srcctlport); /* default is free choice */
#ifdef AF_INET6
        sinme6[stream_idx].sin6_port = htons(ctlport);
        sinhim6[stream_idx].sin6_port = htons(srcctlport); /* default is free choice */
#endif
    } else {
        sinme[stream_idx].sin_port = htons(port + stream_idx - 1);
        sinhim[stream_idx].sin_port = htons(srcport); /* default is free choice */
#ifdef AF_INET6
        sinme6[stream_idx].sin6_port = htons(port + stream_idx - 1);
        sinhim6[stream_idx].sin6_port = htons(srcport); /* default is free choice */
#endif
    }
}
}

```



```

    }
}
sinme[stream_idx].sin_family = af;
#ifdef AF_INET6
    sinme6[stream_idx].sin6_family = af;
#endif

if ((fd[stream_idx] = socket(domain, (udp && (stream_idx != 0))?SOCK_DGRAM:SOCK_STREAM, 0)) < 0)
{
    if (clientserver && !client && (stream_idx == 1)) {
        save_errno = errno;
        fputs("KO\n", stdout);
        mes("Error: socket() on data stream failed");
        fputs("Error: ", stdout);
        fputs(strerror(save_errno), stdout);
        fputs("\n", stdout);
        fputs("KO\n", stdout);
        goto cleanup;
    }
    err("socket");
}

if (setsockopt(fd[stream_idx], SOL_SOCKET, SO_REUSEADDR, (void *)&one, sizeof(one)) < 0) {
    if (clientserver && !client && (stream_idx == 1)) {
        save_errno = errno;
        fputs("KO\n", stdout);
        mes("Error: setsockopt("
            " to so_reuseaddr failed");
        fputs("Error: ", stdout);
        fputs(strerror(save_errno), stdout);
        fputs("\n", stdout);
        fputs("KO\n", stdout);
        goto cleanup;
    }
    err("setsockopt: so_reuseaddr");
}

#ifdef IPV6_V6ONLY
if ((af == AF_INET6) && explicitaf && !v4mapped) {
    if (setsockopt(fd[stream_idx], IPPROTO_IPV6, IPV6_V6ONLY, (void *)&one, sizeof(int)) < 0) {
        if (clientserver && !client &&
            (stream_idx == 1)) {
            save_errno = errno;
            fputs("KO\n", stdout);
            mes("Error: setsockopt("
                " to ipv6_only failed");
            fputs("Error: ", stdout);
            fputs(strerror(save_errno), stdout);
        }
    }
}
#endif

```

```

        fputs("\n", stdout);
        fputs("KO\n", stdout);
        goto cleanup;
    }
    err("setsockopt: ipv6_only");
}
}
#endif

if (af == AF_INET) {
    if (bind(fd[stream_idx], (struct sockaddr *)&sinme[stream_idx], sizeof(sinme[stream_idx])) < 0) {
        if (clientserver && !client && (stream_idx == 1)) {
            save_errno = errno;
            fputs("KO\n", stdout);
            mes("Error: bind() on data stream failed");
            fputs("Error: ", stdout);
            fputs(strerror(save_errno), stdout);
            fputs("\n", stdout);
            if (((!trans && !reverse)
                || (trans && reverse)) &&
                (errno == EADDRINUSE) &&
                (port == IPERF_PORT))
                fputs("Info: Possible collision"
                    " with iperf server\n", stdout);
            fputs("KO\n", stdout);
            goto cleanup;
        }
        if (clientserver && client && (stream_idx == 1) &&
            ((!trans && !reverse) || (trans && reverse)) &&
            (errno == EADDRINUSE) && (port == IPERF_PORT)) {
            errmes("bind");
            fputs("Info: Possible collision"
                " with iperf server\n", stderr);
            fflush(stderr);
            exit(1);
        }
        err("bind");
    }
}

#ifdef AF_INET6
else if (af == AF_INET6) {
    if (bind(fd[stream_idx], (struct sockaddr *)&sinme6[stream_idx], sizeof(sinme6[stream_idx])) < 0) {
        if (clientserver && !client && (stream_idx == 1)) {
            save_errno = errno;
            fputs("KO\n", stdout);
            mes("Error: bind() on data stream failed");
            fputs("Error: ", stdout);
            fputs(strerror(save_errno), stdout);

```

```

        fputs("\n", stdout);
        fputs("KO\n", stdout);
        goto cleanup;
    }
    err("bind");
}
}
#endif
else {
    if (clientserver && !client && (stream_idx == 1)) {
        save_errno = errno;
        fputs("KO\n", stdout);
        mes("Error: unsupported AF on data stream");
        fputs("Error: ", stdout);
        fputs(strerror(save_errno), stdout);
        fputs("\n", stdout);
        fputs("KO\n", stdout);
        goto cleanup;
    }
    err("unsupported AF");
}

if (clientserver && !client && (stream_idx == 1)) {
    /* finally OK to send server "OK" message */
    fprintf(stdout, "OK v%d.%d.%d\n", vers_major,
            vers_minor, vers_delta);
    fflush(stdout);
    if ((trans && !reverse) || (!trans && reverse))
        usleep(50000);
}

if (clientserver && (stream_idx == 1)) {
    if (!udp && trans) {
        nretrans[0] = get_retrans(fd[0]);
        if (retransinfo > 0)
            b_flag = 1;
    }
}

if (stream_idx == nstream) {
    if (brief <= 0)
        mes("socket");
#ifdef HAVE_SETPRIO
    if (priority && (brief <= 0)) {
        errno = 0;
        priority = getpriority(PRIO_PROCESS, 0);
        if (errno)
            mes("couldn't get priority");
    }
#endif
}

```

```

else {
    if (format & PARSE)
        fprintf(stdout,
            "nuttcp%s%s: "
            "priority=%d\n",
            trans ? "-t" : "-r",
            ident, priority);
    else
        fprintf(stdout,
            "nuttcp%s%s: "
            "priority = %d\n",
            trans ? "-t" : "-r",
            ident, priority);
}
}
#endif
#ifdef HAVE_SETAFFINITY
if ((affinity >= 0) && (brief <= 0) && !host3) {
    int cpu_affinity;

    errno = 0;
    sched_getaffinity(0, sizeof(cpu_set_t),
        &cpu_set);
    if (errno)
        mes("couldn't get affinity");
    else {
        for ( cpu_affinity = 0;
            cpu_affinity < ncores;
            cpu_affinity++ ) {
            if (CPU_ISSET(cpu_affinity,
                &cpu_set))
                break;
        }
        if (format & PARSE)
            fprintf(stdout,
                "nuttcp%s%s: "
                "cpu_affinity=%d\n",
                trans ? "-t" : "-r",
                ident, cpu_affinity);
        else
            fprintf(stdout,
                "nuttcp%s%s: "
                "affinity = CPU %d\n",
                trans ? "-t" : "-r",
                ident, cpu_affinity);
    }
}
}
#endif

```

```

if (trans) {
    if ((brief <= 0) && (format & PARSE)) {
        fprintf(stdout, "nuttcp-t%s: buflen=%d ",
            ident, buflen);
    }
    if (nbuf != INT_MAX)
        fprintf(stdout, "nbuf=%llu ", nbuf);
    fprintf(stdout, "nstream=%d port=%d",
        nstream, port);
    if (srcport)
        fprintf(stdout, " srcport=%d", srcport);
    fprintf(stdout, " mode=%s host=%s",
        udp?"udp":"tcp",
        host);
    if (multicast)
        fprintf(stdout, " multicast_ttl=%d",
            multicast);
    fprintf(stdout, "\n");
    if (timeout)
        fprintf(stdout, "nuttcp-t%s: time_limit=%.2f\n",
            ident, timeout);
    if ((rate != MAXRATE) || tos)
        fprintf(stdout, "nuttcp-t%s:", ident);
    if (rate != MAXRATE) {
        fprintf(stdout, " rate_limit=%.3f rate_unit=Mbps rate_mode=%s",
            (double)rate/1000,
            irate ? "instantaneous" : "aggregate");
        if (maxburst > 1)
            fprintf(stdout, " packet_burst=%d",
                maxburst);
        if (udp) {
            unsigned long long ppsrate =
                ((uint64_t)rate * 1000)/8/buflen;

            fprintf(stdout, " pps_rate=%llu",
                ppsrate);
        }
    }
    if (tos)
        fprintf(stdout, " tos=0x%X", tos);
    if ((rate != MAXRATE) || tos)
        fprintf(stdout, "\n");
}
else if (brief <= 0) {
    fprintf(stdout, "nuttcp-t%s: buflen=%d, ",
        ident, buflen);
    if (nbuf != INT_MAX)
        fprintf(stdout, "nbuf=%llu, ", nbuf);
    fprintf(stdout, "nstream=%d, port=%d",

```

```

    nstream, port);
if (srcport)
    fprintf(stdout, ", srcport=%d", srcport);
fprintf(stdout, " %s -> %s",
    udp?"udp":"tcp",
    host);
if (multicast)
    fprintf(stdout, " ttl=%d", multicast);
fprintf(stdout, "\n");
if (timeout)
    fprintf(stdout, "nuttcp-t%s: time limit = %.2f second%s\n",
    ident, timeout,
    (timeout == 1.0)?"":"s");
if ((rate != MAXRATE) || tos)
    fprintf(stdout, "nuttcp-t%s:", ident);
if (rate != MAXRATE) {
    fprintf(stdout, " rate limit = %.3f Mbps (%s)",
    (double)rate/1000,
    irate ? "instantaneous" : "aggregate");
    if (maxburst > 1)
        fprintf(stdout, ", packet burst = %d",
            maxburst);
    if (udp) {
        unsigned long long ppsrate =
            ((uint64_t)rate * 1000)/8/buflen;

        fprintf(stdout, ", %llu pps", ppsrate);
    }
    if (tos)
        fprintf(stdout, ",");
}
if (tos)
    fprintf(stdout, " tos = 0x%X", tos);
if ((rate != MAXRATE) || tos)
    fprintf(stdout, "\n");
}
} else {
    if ((brief <= 0) && (format & PARSE)) {
        fprintf(stdout, "nuttcp-r%s: buflen=%d ",
            ident, buflen);
    }
    if (nbuf != INT_MAX)
        fprintf(stdout, "nbuf=%llu ", nbuf);
    fprintf(stdout, "nstream=%d port=%d",
        nstream, port);
    if (srcport)
        fprintf(stdout, " srcport=%d", srcport);
    fprintf(stdout, " mode=%s\n", udp ? "udp":"tcp");
    if (tos)

```

```

        fprintf(stdout, "nuttcp-r%s: tos=0x%X\n",
            ident, tos);
    if (interval)
        fprintf(stdout, "nuttcp-r%s: reporting_interval=%.2f\n",
            ident, interval);
    }
    else if (brief <= 0) {
        fprintf(stdout, "nuttcp-r%s: buflen=%d, ",
            ident, buflen);
        if (nbuf != INT_MAX)
            fprintf(stdout, "nbuf=%llu, ", nbuf);
        fprintf(stdout, "nstream=%d, port=%d",
            nstream, port);
        if (srcport)
            fprintf(stdout, ", srcport=%d", srcport);
        fprintf(stdout, " %s\n", udp ? "udp":"tcp");
        if (tos)
            fprintf(stdout, "nuttcp-r%s: tos = 0x%X\n",
                ident, tos);
        if (interval)
            fprintf(stdout, "nuttcp-r%s: interval reporting every %.2f second%s\n",
                ident, interval,
                (interval == 1.0)?"":"s");
    }
}
}

if (stream_idx > 0) {
    if (trans) {
        /* Set the transmitter options */
        if (sendwin) {
            if (setsockopt(fd[stream_idx], SOL_SOCKET, SO_SNDBUF,
                (void *)&sendwin, sizeof(sendwin)) < 0)
                errmes("unable to setsockopt SO_SNDBUF");
            if (braindead && (setsockopt(fd[stream_idx], SOL_SOCKET, SO_RCVBUF,
                (void *)&rcvwin, sizeof(rcvwin)) < 0))
                errmes("unable to setsockopt SO_RCVBUF");
        }
        if (tos) {
            if (af == AF_INET) {
                if (setsockopt(fd[stream_idx], IPPROTO_IP, IP_TOS,
                    (void *)&tos, sizeof(tos)) < 0)
                    err("setsockopt");
            }
        }
#ifdef AF_INET6
        else if (af == AF_INET6) {
            if (setsockopt(fd[stream_idx], IPPROTO_IPV6, IPV6_TCLASS,
                (void *)&tos, sizeof(tos)) < 0)

```

```

        err("setsockopt");
    }
#endif
    else {
        err("unsupported AF");
    }
}
if (nodelay && !udp) {
    struct protoent *p;
    p = getprotobyname("tcp");
    if (p && setsockopt(fd[stream_idx], p->p_proto, TCP_NODELAY,
        (void *)&one, sizeof(one)) < 0)
        err("setsockopt: nodelay");
    if ((stream_idx == nstream) && (brief <= 0))
        mes("nodelay");
}
} else {
/* Set the receiver options */
if (rcvwin) {
    if (setsockopt(fd[stream_idx], SOL_SOCKET, SO_RCVBUF,
        (void *)&rcvwin, sizeof(rcvwin)) < 0)
        errmes("unable to setsockopt SO_RCVBUF");
    if (braindead && (setsockopt(fd[stream_idx], SOL_SOCKET, SO_SNDBUF,
        (void *)&sendwin, sizeof(sendwin)) < 0))
        errmes("unable to setsockopt SO_SNDBUF");
}
if (tos) {
    if (af == AF_INET) {
        if (setsockopt(fd[stream_idx], IPPROTO_IP, IP_TOS,
            (void *)&tos, sizeof(tos)) < 0)
            err("setsockopt");
    }
}
#ifdef AF_INET6
    else if (af == AF_INET6) {
        if (setsockopt(fd[stream_idx], IPPROTO_IPV6, IPV6_TCLASS,
            (void *)&tos, sizeof(tos)) < 0)
            err("setsockopt");
    }
}
#endif
    else {
        err("unsupported AF");
    }
}
}
}
if (!udp || (stream_idx == 0)) {
    if (((trans && !reverse) && (stream_idx > 0)) ||
        ((!trans && reverse) && (stream_idx > 0)) ||

```



```

(client && (stream_idx == 0)) {
/* The transmitter initiates the connection
 * (unless reversed by the flip option)
 */
if (options && (stream_idx > 0)) {
    if (setsockopt(fd[stream_idx], SOL_SOCKET, options, (void *)&one, sizeof(one)) < 0)
        errmes("unable to setsockopt options");
    }
    usleep(20000);
    if (trans && (stream_idx > 0) && datamss) {
#ifdef __CYGWIN__ || defined(_WIN32)
        if (format & PARSE)
            fprintf(stderr, "nuttcp%s%s:
Warning=\"setting_maximum_segment_size_not_supported_on_windows\\\"\\n",
                trans?"-t":"-r", ident);
        else
            fprintf(stderr, "nuttcp%s%s: Warning: setting maximum segment size not supported on windows\\n",
                trans?"-t":"-r", ident);
        fflush(stderr);
#endif
    }
    optlen = sizeof(datamss);
    if ((sockopterr = setsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, optlen))
    < 0)
        if (errno != EINVAL)
            err("unable to set maximum segment size");
    }
if (clientserver && !client && (stream_idx == 1)) {
    /* check if client went away */
    pollfds[0].fd = fileno(ctlconn);
    save_events = pollfds[0].events;
    pollfds[0].events = POLLIN | POLLPRI;
    pollfds[0].revents = 0;
    if ((poll(pollfds, 1, 0) > 0) &&
        (pollfds[0].revents & (POLLIN | POLLPRI)))
        goto cleanup;
    pollfds[0].events = save_events;
    }
    num_connect_tries++;
    if (stream_idx == 1)
        gettimeofday(&timeconn1, (struct timezone *)0);
    if (af == AF_INET) {
        error_num = connect(fd[stream_idx], (struct sockaddr *)&sinhim[stream_idx],
sizeof(sinhim[stream_idx]));
    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
        error_num = connect(fd[stream_idx], (struct sockaddr *)&sinhim6[stream_idx],
sizeof(sinhim6[stream_idx]));
    }

```

```

    }
#endif
else {
    err("unsupported AF");
}
if (error_num < 0) {
    if (clientserver && client && (stream_idx == 0)
        && ((errno == ECONNREFUSED) ||
            (errno == ECONNRESET))
        && (num_connect_tries <
            MAX_CONNECT_TRIES)
        && retry_server) {
        /* retry control connection to
         * server for certain possibly
         * transient errors */
        usleep(SERVER_RETRY_USEC);
        goto doit;
    }
    if (!trans && (stream_idx == 0))
        err("connect");
    if (stream_idx > 0) {
        if (clientserver && !client) {
            for (i = 1; i <= stream_idx;
                i++)
                close(fd[i]);
            goto cleanup;
        }
        err("connect");
    }
    if (stream_idx == 0) {
        clientserver = 0;
        if (thirdparty) {
            perror("3rd party connect failed");
            fprintf(stderr, "3rd party nuttcp only supported for client/server mode\n");
            fflush(stderr);
            exit(1);
        }
        if (interval) {
            perror("connect failed");
            fprintf(stderr, "interval option only supported for client/server mode\n");
            fflush(stderr);
            exit(1);
        }
        if (reverse) {
            perror("connect failed");
            fprintf(stderr, "flip option only supported for client/server mode\n");
            fflush(stderr);
            exit(1);
        }
    }
}

```

```

}
if (traceroute) {
    perror("connect failed");
    fprintf(stderr, "traceroute option only supported for client/server mode\n");
    fflush(stderr);
    exit(1);
}
if (host3) {
    perror("connect failed");
    fprintf(stderr, "3rd party nuttcp only supported for client/server mode\n");
    fflush(stderr);
    exit(1);
}
if (multicast) {
    perror("connect failed");
    fprintf(stderr, "multicast only supported for client/server mode\n");
    fflush(stderr);
    exit(1);
}
if (udp) {
    perror("connect failed");
    fprintf(stderr, "UDP transfers only supported for client/server mode\n");
    fflush(stderr);
    exit(1);
}
if (format & PARSE) {
    fprintf(stderr, "nuttcp%s%s: Info=\"attempting_to_switch_to_deprecated_classic_mode\"\n",
            trans?"-t":"-r", ident);
    fprintf(stderr, "nuttcp%s%s: Info=\"will_use_less_reliable_transmitter_side_statistics\"\n",
            trans?"-t":"-r", ident);
}
else {
    fprintf(stderr, "nuttcp%s%s: Info: attempting to switch to deprecated \"classic\" mode\n",
            trans?"-t":"-r", ident);
    fprintf(stderr, "nuttcp%s%s: Info: will use less reliable transmitter side statistics\n",
            trans?"-t":"-r", ident);
}
    fflush(stderr);
}
}
if (stream_idx == 1) {
    gettimeofday(&timeconn2, (struct timezone *)0);
    tvsub( &timeconn, &timeconn2, &timeconn1 );
    rtt = timeconn.tv_sec*1000 +
        ((double)timeconn.tv_usec)/1000;
}
if (sockopterr && trans &&
    (stream_idx > 0) && datamss) {

```

```

optlen = sizeof(datamss);
if ((sockopterr = setsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, optlen))
< 0) {
    if (errno != EINVAL)
        err("unable to set maximum segment size");
    else
        err("setting maximum segment size not supported on this OS");
    }
}
if (stream_idx == nstream) {
    optlen = sizeof(datamss);
    if (getsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, &optlen) < 0)
        err("get dataconn maximum segment size didn't work");
    if (format & DEBUGMTU)
        fprintf(stderr, "datamss = %d\n", datamss);
    }
if ((stream_idx == nstream) && (brief <= 0)) {
    char tmphost[ADDRSTRLEN] = "\0";
    if (af == AF_INET) {
        inet_ntop(af, &sinhim[stream_idx].sin_addr.s_addr,
            tmphost, sizeof(tmphost));
    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
        inet_ntop(af, sinhim6[stream_idx].sin6_addr.s6_addr,
            tmphost, sizeof(tmphost));
    }
#endif
    else {
        err("unsupported AF");
    }

    if (format & PARSE) {
        fprintf(stdout,
            "nuttcp%s%s: connect=%s",
            trans?"-t":"-r", ident,
            tmphost);
        if (trans && datamss) {
            fprintf(stdout, " mss=%d",
                datamss);
        }
        if (rtt)
            fprintf(stdout, P_RTT_FMT, rtt);
    }
    else {
        fprintf(stdout,
            "nuttcp%s%s: connect to %s",
            trans?"-t":"-r", ident,

```

```

        tmphost);
    if (rtt || (trans && datamss))
        fprintf(stdout, " with");
    if (trans && datamss) {
        fprintf(stdout, " mss=%d",
            datamss);
        if (rtt)
            fprintf(stdout, ",");
    }
    if (rtt)
        fprintf(stdout, RTT_FMT, rtt);
}
fprintf(stdout, "\n");
}
} else {
/* The receiver listens for the connection
 * (unless reversed by the flip option)
 */
    if (trans && (stream_idx > 0) && datamss) {
#ifdef __CYGWIN__ || defined(_WIN32)
        if (format & PARSE)
            fprintf(stderr, "nuttcp%s%s:
Warning=\"setting_maximum_segment_size_not_supported_on_windows\"\n",
                trans?"-t":"-r", ident);
        else
            fprintf(stderr, "nuttcp%s%s: Warning: setting maximum segment size not supported on windows\n",
                trans?"-t":"-r", ident);
        fflush(stderr);
#endif
    }
}
#endif

optlen = sizeof(datamss);
if ((sockopterr = setsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, optlen))
    < 0)
    if (errno != EINVAL)
        err("unable to set maximum segment size");
}

listen(fd[stream_idx], LISTEN_BACKLOG);
if (clientserver && !client && (stream_idx == 0)
    && !inetd && !nofork && !forked) {
    if ((pid = fork()) == (pid_t)-1)
        err("can't fork");
    if (pid != 0)
        exit(0);
    forked = 1;
    if (sinkmode) {
        close(0);
        close(1);
        close(2);
        open("/dev/null", O_RDWR);
    }
}

```

```

        dup(0);
        dup(0);
    }
    setsid();
}
if (options && (stream_idx > 0)) {
    if (setsockopt(fd[stream_idx], SOL_SOCKET, options, (void *)&one, sizeof(one)) < 0)
        errmes("unable to setsockopt options");
}
if (sockopterr && trans &&
    (stream_idx > 0) && datamss) {
    optlen = sizeof(datamss);
    if ((sockopterr = setsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, optlen))
< 0)
        if (errno != EINVAL)
            err("unable to set maximum segment size");
}
if (clientserver && (stream_idx > 0)) {
    sigact.sa_handler = ignore_alarm;
    sigemptyset(&sigact.sa_mask);
    sigact.sa_flags = 0;
    sigaction(SIGALRM, &sigact, &savesigact);
    alarm(ACCEPT_TIMEOUT);
}
acceptnewconn:
    fromlen = sizeof(frominet);
    nfd=accept(fd[stream_idx], (struct sockaddr *)&frominet, &fromlen);
    save_errno = errno;
    if (clientserver && (stream_idx > 0)) {
        alarm(0);
        sigact.sa_handler = savesigact.sa_handler;
        sigact.sa_mask = savesigact.sa_mask;
        sigact.sa_flags = savesigact.sa_flags;
        sigaction(SIGALRM, &sigact, 0);
    }
    if (nfd < 0) {
        /* check for interrupted system call - on
        * server, close data streams, cleanup and
        * try again - all other errors just die
        */
        if ((save_errno == EINTR) && clientserver
            && (stream_idx > 0)) {
            if (client) {
                /* if client, just give nice
                * error message and exit
                */
                mes("Error: accept() timeout");
                exit(1);
            }
        }
    }
}

```

```

    }
    for ( i = 1; i <= stream_idx; i++ )
        close(fd[i]);
    goto cleanup;
}
err("accept");
}
if (clientserver && !client && (stream_idx == 0)
    && !inetd && !nofork
    && !single_threaded) {
/* multi-threaded manually started server */
if ((pid = fork()) == (pid_t)-1)
    err("can't fork");
if (pid != 0) {
/* parent just waits for quick
 * child exit */
while ((wait_pid = wait(&pidstat))
    != pid) {
    if (wait_pid == (pid_t)-1) {
        if (errno == ECHILD)
            break;
        err("wait failed");
    }
}
/* and then accept()s another client
 * connection */
close(nfd);
stream_idx = 0;
if (oneshot)
    exit(0);
goto acceptnewconn;
}
/* child just makes a grandchild and then
 * immediately exits (avoid zombie processes) */
if ((pid = fork()) == (pid_t)-1)
    err("can't fork");
if (pid != 0)
    exit(0);
/* grandkid does all the work */
oneshot = 1;
}
af = frominet.ss_family;
close(fd[stream_idx]);
fd[stream_idx]=nfd;
if (sockopterr && trans &&
    (stream_idx > 0) && datamss) {
    optlen = sizeof(datamss);
    if ((sockopterr = setsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, optlen))

```

```

< 0) {
    if (errno != EINVAL)
        err("unable to set maximum segment size");
    else
        err("setting maximum segment size not supported on this OS");
}
}
if (stream_idx == nstream) {
    optlen = sizeof(datamss);
    if (getsockopt(fd[stream_idx], IPPROTO_TCP, TCP_MAXSEG, (void *)&datamss, &optlen) < 0)
        err("get dataconn maximum segment size didn't work");
    if (format & DEBUGMTU)
        fprintf(stderr, "datamss = %d\n", datamss);
}
if (af == AF_INET) {
    struct sockaddr_in peer;
    socklen_t peerlen = sizeof(peer);
    if (getpeername(fd[stream_idx],
        (struct sockaddr *)&peer,
        &peerlen) < 0) {
        err("getpeername");
    }
    if ((stream_idx == nstream) && (brief <= 0)) {
        char tmphost[ADDRSTRLEN] = "\0";
        inet_ntop(af, &peer.sin_addr.s_addr,
            tmphost, sizeof(tmphost));

        if (format & PARSE) {
            fprintf(stdout,
                "nuttcp%s%s: accept=%s",
                trans?"-t":"-r", ident,
                tmphost);
            if (trans && datamss) {
                fprintf(stdout, " mss=%d",
                    datamss);
            }
        }
        else {
            fprintf(stdout,
                "nuttcp%s%s: accept from %s",
                trans?"-t":"-r", ident,
                tmphost);
            if (trans && datamss) {
                fprintf(stdout, " with mss=%d",
                    datamss);
            }
        }
    }
    fprintf(stdout, "\n");
}

```



```

    }
    if (stream_idx == 0) {
        clientaddr = peer.sin_addr;
        client_ipaddr.ss.ss_family = AF_INET;
        client_ipaddr.sin.sin_addr = clientaddr;
    }
}
#ifdef AF_INET6
else if (af == AF_INET6) {
    struct sockaddr_in6 peer;
    socklen_t peerlen = sizeof(peer);
    if (getpeername(fd[stream_idx],
        (struct sockaddr *)&peer,
        &peerlen) < 0) {
        err("getpeername");
    }
    if ((stream_idx == nstream) && (brief <= 0)) {
        char tmphost[ADDRSTRLEN] = "\0";
        inet_ntop(af, peer.sin6_addr.s6_addr,
            tmphost, sizeof(tmphost));
        if (format & PARSE) {
            fprintf(stdout,
                "nuttcp%s%s: accept=%s",
                trans?"-t":"-r", ident,
                tmphost);
            if (trans && datamss) {
                fprintf(stdout, " mss=%d", datamss);
            }
        }
    }
    else {
        fprintf(stdout,
            "nuttcp%s%s: accept from %s",
            trans?"-t":"-r", ident,
            tmphost);
        if (trans && datamss) {
            fprintf(stdout, " with mss=%d",
                datamss);
        }
    }
}
fprintf(stdout, "\n");
}
if (stream_idx == 0) {
    clientaddr6 = peer.sin6_addr;
    clientscope6 = peer.sin6_scope_id;
    client_ipaddr.ss.ss_family = AF_INET6;
    client_ipaddr.sin6.sin6_addr = clientaddr6;
}
}

```

```

#endif
    else {
        err("unsupported AF");
    }
}
}
if (!udp && trans && (stream_idx >= 1) && (retransinfo > 0)) {
    if ((stream_idx == 1) || (retransinfo == 1)) {
        nretrans[stream_idx] =
            get_retrans(fd[stream_idx]);
        iretrans[stream_idx] = nretrans[stream_idx];
    }
}
optlen = sizeof(sendwinval);
if (getsockopt(fd[stream_idx], SOL_SOCKET, SO_SNDBUF, (void *)&sendwinval, &optlen) < 0)
    err("get send window size didn't work");
#if defined(linux)
    sendwinval /= 2;
#endif
if ((stream_idx > 0) && sendwin && (trans || braindead) &&
    (sendwinval < (0.98 * sendwin))) {
    if (format & PARSE)
        fprintf(stderr, "nuttcp%s%s: Warning=\\"send_window_size_%d<_requested_window_size_%d\\\"\\n",
            trans?"-t":"-r", ident,
            sendwinval, sendwin);
    else
        fprintf(stderr, "nuttcp%s%s: Warning: send window size %d < requested window size %d\\n",
            trans?"-t":"-r", ident,
            sendwinval, sendwin);
    fflush(stderr);
}
optlen = sizeof(rcvwinval);
if (getsockopt(fd[stream_idx], SOL_SOCKET, SO_RCVBUF, (void *)&rcvwinval, &optlen) < 0)
    err("Get recv window size didn't work");
#if defined(linux)
    rcvwinval /= 2;
#endif
if ((stream_idx > 0) && rcvwin && (!trans || braindead) &&
    (rcvwinval < (0.98 * rcvwin))) {
    if (format & PARSE)
        fprintf(stderr, "nuttcp%s%s: Warning=\\"receive_window_size_%d<_requested_window_size_%d\\\"\\n",
            trans?"-t":"-r", ident,
            rcvwinval, rcvwin);
    else
        fprintf(stderr, "nuttcp%s%s: Warning: receive window size %d < requested window size %d\\n",
            trans?"-t":"-r", ident,
            rcvwinval, rcvwin);
    fflush(stderr);
}

```

```

    }

    if (firsttime) {
        firsttime = 0;
        origsendwin = sendwinval;
        origrcvwin = rcvwinval;
    }

    if ((stream_idx == nstream) && (brief <= 0)) {
#ifdef defined(linux)
        FILE *adv_ws;

        sendwinval *= 2;
        rcvwinval *= 2;
        if ((adv_ws = fopen(TCP_ADV_WIN_SCALE, "r")) {
            if (fscanf(adv_ws, "%d", &winadjust) <= 0)
                winadjust = 2;
            fclose(adv_ws);
        }
        else {
            winadjust = 2;
        }
        if (winadjust < 0) {
            sendwinavail = sendwinval >> -winadjust;
            rcvwinavail = rcvwinval >> -winadjust;
        }
        else if (winadjust > 0) {
            sendwinavail = sendwinval -
                (sendwinval >> winadjust);
            rcvwinavail = rcvwinval -
                (rcvwinval >> winadjust);
        }
    }
#endif

    if (format & PARSE)
        fprintf(stdout, "nuttcp%s%s: send_window_size=%d receive_window_size=%d\n", trans?"-t":"-r", ident,
sendwinval, rcvwinval);
    else
        fprintf(stdout, "nuttcp%s%s: send window size = %d, receive window size = %d\n", trans?"-t":"-r", ident,
sendwinval, rcvwinval);
#ifdef defined(linux)
    if (format & PARSE)
        fprintf(stdout, "nuttcp%s%s: send_window_avail=%d receive_window_avail=%d\n", trans?"-t":"-r", ident,
sendwinavail, rcvwinavail);
    else
        fprintf(stdout, "nuttcp%s%s: available send window = %d, available receive window = %d\n", trans?"-t":"-r",
ident, sendwinavail, rcvwinavail);
#endif
}

```

```

}

if (abortconn)
    exit(1);

if (host3 && clientserver) {
    char path[64];
    char *cmd;

    fflush(stdout);
    fflush(stderr);
    cmd = nut_cmd;

    if (client) {
        if ((pid = fork()) == (pid_t)-1)
            err("can't fork");
        if (pid == 0) {
            if (interval) {
                itimer.it_value.tv_sec = interval;
            }
            else if (timeout) {
                itimer.it_value.tv_sec = timeout;
            }
            else {
                if (rate != MAXRATE)
                    itimer.it_value.tv_sec =
                        (double)(2*nbuf*buflen)
                            /rate/125;
                else
                    itimer.it_value.tv_sec =
                        (double)(nbuf*buflen)
                            /LOW_RATE_HOST3/125;
                if (itimer.it_value.tv_sec < 7200)
                    itimer.it_value.tv_sec = 7200;
            }
            itimer.it_value.tv_sec +=
                idle_data_max < SRVR_INFO_TIMEOUT ?
                    SRVR_INFO_TIMEOUT : idle_data_max;
            itimer.it_value.tv_usec = 0;
            itimer.it_interval.tv_sec = 0;
            itimer.it_interval.tv_usec = 0;
            setitimer(ITIMER_REAL, &itimer, 0);
            while (fgets(linebuf, sizeof(linebuf),
                stdin) && !intr) {
                setitimer(ITIMER_REAL, &itimer, 0);
                if (strncmp(linebuf, "DONE", 4)
                    == 0)
                    exit(0);
            }
        }
    }
}

```

```

    if (*ident && (*linebuf != '\n'))
        fprintf(stdout, "%s: ",
            ident + 1);
    fputs(linebuf, stdout);
    fflush(stdout);
}
itimer.it_value.tv_sec = 0;
itimer.it_value.tv_usec = 0;
setitimer(ITIMER_REAL, &itimer, 0);
exit(0);
}
signal(SIGINT, SIG_IGN);
while ((wait_pid = wait(&pidstat)) != pid) {
    if (wait_pid == (pid_t)-1) {
        if (errno == ECHILD)
            break;
        err("wait failed");
    }
}
exit(0);
}
else {
    if ((pid = fork()) == (pid_t)-1)
        err("can't fork");
    if (pid != 0) {
        sigact.sa_handler = &sigalarm;
        sigemptyset(&sigact.sa_mask);
        sigact.sa_flags = 0;
        sigaction(SIGALRM, &sigact, 0);
        alarm(10);
        while ((wait_pid = wait(&pidstat))
            != pid) {
            if (wait_pid == (pid_t)-1) {
                if (errno == ECHILD)
                    break;
                if (errno == EINTR) {
                    pollfds[0].fd =
                        fileno(ctlconn);
                    pollfds[0].events =
                        POLLIN | POLLPRI;
                    pollfds[0].revents = 0;
                    if ((poll(pollfds, 1, 0)
                        > 0)
                        && (pollfds[0].revents &
                            (POLLIN | POLLPRI))) {
                        kill(pid,
                            SIGINT);
                        sleep(1);
                    }
                }
            }
        }
    }
}
}

```

```

        kill(pid,
            SIGINT);
        continue;
    }
    sigact.sa_handler =
        &sigalarm;
    sigemptyset(&sigact.sa_mask);
    sigact.sa_flags = 0;
    sigaction(SIGALRM,
        &sigact, 0);
    alarm(10);
    continue;
}
err("wait failed");
}
}
fprintf(stdout, "DONE\n");
fflush(stdout);
goto cleanup;
}
close(2);
dup(1);
i = 0;
j = 0;
cmdargs[i++] = cmd;
cmdargs[i++] = "-3";
if (ctlport3) {
    sprintf(tmpargs[j], "-P%hu", ctlport3);
    cmdargs[i++] = tmpargs[j++];
}
else {
    if (pass_ctlport) {
        sprintf(tmpargs[j], "-P%hu", ctlport);
        cmdargs[i++] = tmpargs[j++];
    }
}
if (affinity >= 0) {
    sprintf(tmpargs[j], "-xc%d", affinity);
    cmdargs[i++] = tmpargs[j++];
}
if (svr_affinity >= 0) {
    sprintf(tmpargs[j], "-xcs%d", svr_affinity);
    cmdargs[i++] = tmpargs[j++];
}
if (irvers < 50302) {
    if ((udp && !multicast
        && (buflen != DEFAULTUDPBUFLen)) ||
        (udp && multicast

```

```

    && (buflen != DEFAULT_MC_UDPBUFLLEN)) ||
    (!udp && (buflen != 65536))) {
    sprintf(tmpargs[j], "-l%d", buflen);
    cmdargs[i++] = tmpargs[j++];
    }
}
else if (buflen) {
    sprintf(tmpargs[j], "-l%d", buflen);
    cmdargs[i++] = tmpargs[j++];
}
if (nbuf != INT_MAX) {
    if (nbuf_bytes)
        sprintf(tmpargs[j], "-n%llub", nbuf);
    else
        sprintf(tmpargs[j], "-n%llu", nbuf);
    cmdargs[i++] = tmpargs[j++];
}
if (brief3 != 1) {
    sprintf(tmpargs[j], "-b%d", brief3);
    cmdargs[i++] = tmpargs[j++];
}
if (sendwin) {
    sprintf(tmpargs[j], "-w%d", sendwin/1024);
    cmdargs[i++] = tmpargs[j++];
}
if (nstream != 1) {
    sprintf(tmpargs[j], "-N%d%s", nstream,
        multilink ? "m" : "");
    cmdargs[i++] = tmpargs[j++];
}
if (rate != MAXRATE) {
    if (maxburst > 1) {
        if (rate_pps)
            sprintf(tmpargs[j],
                "-R%s%lup/%d",
                irate ? "i" : "",
                rate, maxburst);
        else
            sprintf(tmpargs[j],
                "-R%s%lu/%d",
                irate ? "i" : "",
                rate, maxburst);
    }
    else {
        if (rate_pps)
            sprintf(tmpargs[j], "-R%s%lup",
                irate ? "i" : "", rate);
        else

```

```

        sprintf(tmpargs[j], "-R%s%lu",
            irate ? "i" : "", rate);
    }
    cmdargs[i++] = tmpargs[j++];
} else {
    if (udp && !multicast)
        cmdargs[i++] = "-R0";
    }
    if (srcport) {
        sprintf(tmpargs[j], "-p%hu:%hu", srcport, port);
        cmdargs[i++] = tmpargs[j++];
    }
    else if (port != DEFAULT_PORT) {
        sprintf(tmpargs[j], "-p%hu", port);
        cmdargs[i++] = tmpargs[j++];
    }
    }
    if (trans)
        cmdargs[i++] = "-r";
    if (braindead)
        cmdargs[i++] = "-wb";
    if (timeout && (timeout != DEFAULT_TIMEOUT)) {
        sprintf(tmpargs[j], "-T%f", timeout);
        cmdargs[i++] = tmpargs[j++];
    }
    }
    if (udp) {
        if (multicast) {
            if (ssm == 1)
                sprintf(tmpargs[j], "-ms%d",
                    multicast);
            else if (ssm == 0)
                sprintf(tmpargs[j], "-ma%d",
                    multicast);
            else
                sprintf(tmpargs[j], "-m%d",
                    multicast);
            cmdargs[i++] = tmpargs[j++];
            if (mc_addr) {
                sprintf(tmpargs[j], "-g%s",
                    mc_addr);
                cmdargs[i++] = tmpargs[j++];
            }
        }
        }
        else
            cmdargs[i++] = "-u";
    }
    if (do_jitter) {
        cmdargs[i++] = "-j";
    }
    }

```



```

if (do_owd) {
    cmdargs[i++] = "-o";
}
if (interval) {
    sprintf(tmpargs[j], "-i%f", interval);
    cmdargs[i++] = tmpargs[j++];
}
if (reverse)
    cmdargs[i++] = "-F";
if (format) {
    if (format & XMITSTATS)
        cmdargs[i++] = "-fxmitstats";
    if (format & RUNNINGTOTAL)
        cmdargs[i++] = "-frunningtotal";
    if (format & NOPERCENTLOSS)
        cmdargs[i++] = "-f-percentloss";
    if (format & NODROPS)
        cmdargs[i++] = "-f-drops";
    if (format & NORETRANS)
        cmdargs[i++] = "-f-retrans";
    if (format & PARSE)
        cmdargs[i++] = "-fparse";
}
else {
    cmdargs[i++] = "-f-rtt";
}
if (traceroute)
    cmdargs[i++] = "-xt";
if (datamss) {
    sprintf(tmpargs[j], "-M%d", datamss);
    cmdargs[i++] = tmpargs[j++];
}
if (tos) {
    sprintf(tmpargs[j], "-c0x%Xt", tos);
    cmdargs[i++] = tmpargs[j++];
}
if (nodelay)
    cmdargs[i++] = "-D";
if (ipad_stride.ip32) {
    sprintf(tmpargs[j], "%s+%d", host3,
        ipad_stride.ip32);
    cmdargs[i++] = tmpargs[j++];
}
else
    cmdargs[i++] = host3;
cmdargs[i] = NULL;
execvp(cmd, cmdargs);
if (errno == ENOENT) {

```

```

        strcpy(path, "/usr/local/sbin");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/local/bin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/sbin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/sbin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/etc/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if ((errno == ENOENT) && (getuid() != 0)
        && (geteuid() != 0)) {
        strcpy(path, ".");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    perror("execvp failed");
    fprintf(stderr, "failed to execute %s\n", cmd);
    fflush(stdout);
    fflush(stderr);
    if (!inetd)
        exit(0);
    goto cleanup;
}
}

if (traceroute && clientserver) {
    char path[64];
    char *cmd;

    fflush(stdout);
    fflush(stderr);
    if (multicast) {
        cmd = "mtrace";
    }
}

```

```

#ifdef AF_INET6
    if (af == AF_INET6)
        cmd = "mtrace6";
#endif
}
else {
    cmd = "traceroute";
#ifdef AF_INET6
    if (af == AF_INET6)
        cmd = "traceroute6";
#endif
}
if (client) {
    if ((pid = fork()) == (pid_t)-1)
        err("can't fork");
    if (pid != 0) {
        while ((wait_pid = wait(&pidstat)) != pid) {
            if (wait_pid == (pid_t)-1) {
                if (errno == ECHILD)
                    break;
                err("wait failed");
            }
        }
        fflush(stdout);
    }
    else {
        signal(SIGINT, SIG_DFL);
        close(2);
        dup(1);
        i = 0;
        cmdargs[i++] = cmd;
        cmdargs[i++] = host;
        cmdargs[i] = NULL;
        execvp(cmd, cmdargs);
        if (errno == ENOENT) {
            strcpy(path, "/usr/local/sbin/");
            strcat(path, cmd);
            execv(path, cmdargs);
        }
        if (errno == ENOENT) {
            strcpy(path, "/usr/local/bin/");
            strcat(path, cmd);
            execv(path, cmdargs);
        }
        if (errno == ENOENT) {
            strcpy(path, "/usr/sbin/");
            strcat(path, cmd);
            execv(path, cmdargs);
        }
    }
}

```

```

    }
    if (errno == ENOENT) {
        strcpy(path, "/sbin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/etc/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    perror("execvp failed");
    fprintf(stderr, "failed to execute %s\n", cmd);
    fflush(stdout);
    fflush(stderr);
    exit(0);
}
}
fprintf(stdout, "\n");
if (intr) {
    intr = 0;
    fprintf(stdout, "\n");
    signal(SIGINT, sigint);
}
if (!skip_data) {
    for ( stream_idx = 1; stream_idx <= nstream;
         stream_idx++ )
        close(fd[stream_idx]);
}
if (client) {
    if ((pid = fork()) == (pid_t)-1)
        err("can't fork");
    if (pid == 0) {
        while (fgets(linebuf, sizeof(linebuf),
                     stdin) && !intr) {
            if (strncmp(linebuf, "DONE", 4)
                == 0)
                exit(0);
            fputs(linebuf, stdout);
            fflush(stdout);
        }
        exit(0);
    }
    signal(SIGINT, SIG_IGN);
    while ((wait_pid = wait(&pidstat)) != pid) {
        if (wait_pid == (pid_t)-1) {
            if (errno == ECHILD)
                break;

```

```

        err("wait failed");
    }
}
exit(0);
}
else {
    if (!inetd) {
        if ((pid = fork()) == (pid_t)-1)
            err("can't fork");
        if (pid != 0) {
            while ((wait_pid = wait(&pidstat))
                != pid) {
                if (wait_pid == (pid_t)-1) {
                    if (errno == ECHILD)
                        break;
                    err("wait failed");
                }
            }
            fprintf(stdout, "DONE\n");
            fflush(stdout);
            goto cleanup;
        }
    }
    close(2);
    dup(1);
    i = 0;
    cmdargs[i++] = cmd;
    cmdargs[i++] = host;
    cmdargs[i] = NULL;
    execvp(cmd, cmdargs);
    if (errno == ENOENT) {
        strcpy(path, "/usr/local/sbin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/local/bin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/sbin/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/sbin/");
        strcat(path, cmd);
    }
}

```

```

        execv(path, cmdargs);
    }
    if (errno == ENOENT) {
        strcpy(path, "/usr/etc/");
        strcat(path, cmd);
        execv(path, cmdargs);
    }
    perror("execvp failed");
    fprintf(stderr, "failed to execute %s\n", cmd);
    fflush(stdout);
    fflush(stderr);
    if (!inetd)
        exit(0);
    goto cleanup;
}
}

if (multicast) {
    struct sockaddr_in peer;
    socklen_t peerlen = sizeof(peer);
    struct sockaddr_in me;
    socklen_t melen = sizeof(me);
#ifdef AF_INET6
    struct sockaddr_in6 peer6;
    socklen_t peer6len = sizeof(peer6);
    struct sockaddr_in6 me6;
    socklen_t me6len = sizeof(me6);
#endif
    if (mc_addr && !client) {
        bzero(&hints, sizeof(hints));
        hints.ai_flags = AI_NUMERICHOST;
        if (udp)
            hints.ai_socktype = SOCK_DGRAM;
        else
            hints.ai_socktype = SOCK_STREAM;
        mcrs = NULL;
        error_num = getaddrinfo(mc_addr, NULL, &hints, &mcrs);
        if (error_num) {
            sprintf(tmpbuf, "getaddrinfo: "
                "bad multicast IP address: "
                "%s: %s",
                mc_addr, gai_strerror(error_num));
            errno = EINVAL;
            err(tmpbuf);
        }
        if (mcrs->ai_family == AF_INET) {
            struct sockaddr_in *group;
            struct in_addr ipv4_mcaddr;

```

```

group = (struct sockaddr_in *)mres->ai_addr;
bcopy((char *)&(group->sin_addr),
      (char *)&ipv4_mcaddr,
      sizeof(struct in_addr));
if (ssm) {
    if (((htonl(ipv4_mcaddr.s_addr)
             & 0xFF000000) !=
         (HI_MC_SSM << 24))) {
        sprintf(tmpbuf,
                "bad SSM multicast "
                "IP address: %s: "
                "use 232.x.y.z",
                mcgaddr);
        errno = EINVAL;
        err(tmpbuf);
    }
}
else {
    if (((htonl(ipv4_mcaddr.s_addr)
             & 0xFF000000) !=
         (HI_MC << 24))) {
        sprintf(tmpbuf,
                "bad ASM multicast "
                "IP address: %s: "
                "use 231.x.y.z",
                mcgaddr);
        errno = EINVAL;
        err(tmpbuf);
    }
}
}
}
#endif AF_INET6
if (mres->ai_family == AF_INET6) {
    struct sockaddr_in6 *group;

    group = (struct sockaddr_in6 *)mres->ai_addr;
    if (ssm) {
        if ((bcmp((char *)&(group->sin6_addr),
                  (char *)&hi_mc6,
                  HI_MC6_LEN - 1) != 0) ||
            (group->sin6_addr.s6_addr[HI_MC6_LEN - 1]
             < 0x80)) {
            sprintf(tmpbuf,
                    "bad SSM multicast "
                    "IP address: %s: use "
                    "ff3e::[8-f]xxx:yyyy",
                    mcgaddr);

```

```

        errno = EINVAL;
        err(tmpbuf);
    }
}
else {
    if ((bcmp((char *)&(group->sin6_addr),
             (char *)&hi_mc6_asm,
             HI_MC6_ASM_LEN) != 0)) {
        sprintf(tmpbuf,
                "bad ASM multicast "
                "IP address: %s: use "
                "ff2e::www:xxxx:"
                "yyyy:zzzz",
                mcgaddr);
        errno = EINVAL;
        err(tmpbuf);
    }
}
}
#endif
mc_af = mcres->ai_family;
}

if (mc_af == AF_INET) {
    if (getpeername(fd[0], (struct sockaddr *)&peer,
                   &peerlen) < 0) {
        err("getpeername");
    }
    if (getsockname(fd[0], (struct sockaddr *)&me,
                   &melen) < 0) {
        err("getsockname");
    }
}
#ifdef AF_INET6
else if (mc_af == AF_INET6) {
    if (getpeername(fd[0], (struct sockaddr *)&peer6,
                   &peer6len) < 0) {
        err("getpeername");
    }
    if (getsockname(fd[0], (struct sockaddr *)&me6,
                   &me6len) < 0) {
        err("getsockname");
    }
}
#endif /* AF_INET6 */
else {
    err("unsupported AF");
}

```



```

if (!trans) {
    if ((mc_af == AF_INET) && !ssm) { /* IPv4 ASM */
        /* The multicast receiver must join the mc group */
        if (mc_addr) {
            struct sockaddr_in *user_group;

            user_group =
                (struct sockaddr_in *)mcre->ai_addr;
            bcopy((char *)&(user_group->sin_addr.s_addr),
                (char *)&mc_group.imr_multiaddr.s_addr,
                sizeof(struct in_addr));
        }
        else if (client && (irvers >= 50505)) {
            bcopy((char *)&me.sin_addr.s_addr,
                (char *)&mc_group.imr_multiaddr.s_addr,
                sizeof(struct in_addr));
        }
        else {
            bcopy((char *)&peer.sin_addr.s_addr,
                (char *)&mc_group.imr_multiaddr.s_addr,
                sizeof(struct in_addr));
        }
        if (!mc_addr) {
            mc_group.imr_multiaddr.s_addr &=
                htonl(0xFFFFFFFF);
            mc_group.imr_multiaddr.s_addr |=
                htonl(HI_MC << 24);
        }
        if (setsockopt(fd[1], IPPROTO_IP, IP_ADD_MEMBERSHIP,
            (void *)&mc_group, sizeof(mc_group)) < 0)
            err("setsockopt: IP_ADD_MEMBERSHIP");
        if (brief <= 0) {
            inet_ntop(mc_af, &peer.sin_addr.s_addr,
                multsrc, sizeof(multsrc));
            inet_ntop(mc_af, &mc_group.imr_multiaddr,
                multaddr, sizeof(multaddr));

            if (format & PARSE)
                fprintf(stdout,
                    "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=0\n",
                    trans?"-t":"-r", ident,
                    multsrc, multaddr);
            else
                fprintf(stdout,
                    "nuttcp%s%s: receive from multicast source %s\n",
                    trans?"-t":"-r", ident,
                    multsrc);
        }
    }
}

```

```

        fprintf(stdout,
            "nuttcp%s%s: using asm on multicast group %s\n",
            trans?"-t":"-r", ident,
            multaddr);
    }
}
#ifdef AF_INET6
else if ((mc_af == AF_INET6) && !ssm) { /* IPv6 ASM */
/* The multicast receiver must join the mc group */
if (mc_addr) {
    struct sockaddr_in6 *user_group;

    user_group =
        (struct sockaddr_in6 *)mres->ai_addr;
    bcopy((char *)&(user_group->sin6_addr),
        (char *)&mc6_group.ipv6mr_multiaddr,
        sizeof(struct in6_addr));
}
else if (client) {
    bcopy((char *)&me6.sin6_addr,
        (char *)&mc6_group.ipv6mr_multiaddr,
        sizeof(struct in6_addr));
}
else {
    bcopy((char *)&peer6.sin6_addr,
        (char *)&mc6_group.ipv6mr_multiaddr,
        sizeof(struct in6_addr));
}
if (!mc_addr) {
    bcopy((char *)&hi_mc6_asm,
        (char *)&mc6_group.ipv6mr_multiaddr,
        HI_MC6_ASM_LEN);
}
if (setsockopt(fd[1], IPPROTO_IPV6, IPV6_JOIN_GROUP,
    (void *)&mc6_group,
    sizeof(mc6_group)) < 0)
    err("setsockopt: IPV6_JOIN_GROUP");
if (brief <= 0) {
    inet_ntop(mc_af, &peer6.sin6_addr,
        multsrc, sizeof(multsrc));
    inet_ntop(mc_af, &mc6_group.ipv6mr_multiaddr,
        multaddr, sizeof(multaddr));

    if (format & PARSE)
        fprintf(stdout,
            "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=0\n",
            trans?"-t":"-r", ident,
            multsrc, multaddr);
}
}

```

```

else
    fprintf(stdout,
        "nuttcp%s%s: receive from multicast source %s\n",
        trans?"-t":"-r", ident,
        multsrc);
    fprintf(stdout,
        "nuttcp%s%s: using asm on multicast group %s\n",
        trans?"-t":"-r", ident,
        multaddr);
}
}
#endif /* AF_INET6 */
#ifdef MCAST_JOIN_SOURCE_GROUP
else if ((mc_af == AF_INET) && ssm) { /* IPv4 SSM */
/* multicast receiver joins the mc source group */
union sockaddr_union group_ipaddr;
struct sockaddr_in *group;
struct sockaddr_in *source;

group = &group_ipaddr.sin;
source =
    (struct sockaddr_in *)&group_source_req.gsr_source;
group_source_req.gsr_interface = 0; /* any interface */
if (mc_addr) {
    struct sockaddr_in *user_group;

    user_group =
        (struct sockaddr_in *)mcre->ai_addr;
    bcopy((char *)user_group, (char *)group,
        sizeof(struct sockaddr_in));
}
else if (client) {
    bcopy((char *)&me, (char *)group,
        sizeof(struct sockaddr_in));
}
else {
    bcopy((char *)&peer, (char *)group,
        sizeof(struct sockaddr_in));
}
bcopy((char *)&peer, (char *)source,
    sizeof(struct sockaddr_in));
if (!mc_addr) {
    group->sin_addr.s_addr &= htonl(0xFFFFFFFF);
    group->sin_addr.s_addr |=
        htonl(HI_MC_SSM << 24);
}
group_source_req.gsr_group = group_ipaddr.ss;
if (setsockopt(fd[1], IPPROTO_IP,

```

```

        MCAST_JOIN_SOURCE_GROUP,
        &group_source_req,
        sizeof(group_source_req)) < 0)
    err("setsockopt: MCAST_JOIN_SOURCE_GROUP");
if (brief <= 0) {
    inet_ntop(mc_af, &source->sin_addr.s_addr,
        multsrc, sizeof(multsrc));
    inet_ntop(mc_af, &group->sin_addr.s_addr,
        multaddr, sizeof(multaddr));
    if (format & PARSE)
        fprintf(stdout,
            "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=1\n",
            trans?"-t":"-r", ident,
            multsrc, multaddr);
    else
        fprintf(stdout,
            "nuttcp%s%s: receive from multicast source %s\n",
            trans?"-t":"-r", ident,
            multsrc);
        fprintf(stdout,
            "nuttcp%s%s: using ssm on multicast group %s\n",
            trans?"-t":"-r", ident,
            multaddr);
    }
}
#ifdef AF_INET6
else if ((mc_af == AF_INET6) && ssm) { /* IPv6 SSM */
/* multicast receiver joins the mc source group */
struct sockaddr_in6 *group;
struct sockaddr_in6 *source;

group =
    (struct sockaddr_in6 *)&group_source_req.gsr_group;
source =
    (struct sockaddr_in6 *)&group_source_req.gsr_source;
group_source_req.gsr_interface = 0; /* any interface */
if (mc_addr) {
    struct sockaddr_in6 *user_group;

    user_group =
        (struct sockaddr_in6 *)mcre->ai_addr;
    bcopy((char *)user_group, (char *)group,
        sizeof(struct sockaddr_in6));
    }
else if (client) {
    bcopy((char *)&me6, (char *)group,
        sizeof(struct sockaddr_in6));
    }
}

```

```

else {
    bcopy((char *)&peer6, (char *)group,
        sizeof(struct sockaddr_in6));
}
bcopy((char *)&peer6, (char *)source,
    sizeof(struct sockaddr_in6));
if (!mc_addr) {
    bcopy((char *)&hi_mc6,
        (char *)&group->sin6_addr,
        HI_MC6_LEN);
}
if (setsockopt(fd[1], IPPROTO_IPV6,
    MCAST_JOIN_SOURCE_GROUP,
    &group_source_req,
    sizeof(group_source_req)) < 0)
    err("setsockopt: MCAST_JOIN_SOURCE_GROUP");
if (brief <= 0) {
    inet_ntop(mc_af, &source->sin6_addr.s6_addr,
        multsrc, sizeof(multsrc));
    inet_ntop(mc_af, &group->sin6_addr.s6_addr,
        multaddr, sizeof(multaddr));
    if (format & PARSE)
        fprintf(stdout,
            "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=1\n",
            trans?"-t":"-r", ident,
            multsrc, multaddr);
    else
        fprintf(stdout,
            "nuttcp%s%s: receive from multicast source %s\n",
            trans?"-t":"-r", ident,
            multsrc);
        fprintf(stdout,
            "nuttcp%s%s: using ssm on multicast group %s\n",
            trans?"-t":"-r", ident,
            multaddr);
    }
}
#endif /* AF_INET6 */
#endif /* MCAST_JOIN_SOURCE_GROUP */
else {
    err("unsupported AF");
}
}
else { /* trans */
    if (mc_af == AF_INET) {
        bcopy((char *)&sinhim[1].sin_addr.s_addr,
            (char *)&save_sinhim.sin_addr.s_addr,
            sizeof(struct in_addr));
    }
}

```

```

    }
#ifdef AF_INET6
    else if (mc_af == AF_INET6) {
        bcopy((char *)&sinhim6[1], (char *)&save_sinhim6,
            sizeof(struct sockaddr_in6));
    }
#endif
    if ((mc_af == AF_INET) && !ssm) { /* IPv4 ASM */
        /* The multicast transmitter just sends to mc group */
        if (mc_addr) {
            struct sockaddr_in *user_group;

            user_group =
                (struct sockaddr_in *)mcre->ai_addr;
            bcopy((char *)&(user_group->sin_addr.s_addr),
                (char *)&sinhim[1].sin_addr.s_addr,
                sizeof(struct in_addr));
        }
        else if (client || (irvers < 50505)) {
            bcopy((char *)&me.sin_addr.s_addr,
                (char *)&sinhim[1].sin_addr.s_addr,
                sizeof(struct in_addr));
        }
        else {
            bcopy((char *)&peer.sin_addr.s_addr,
                (char *)&sinhim[1].sin_addr.s_addr,
                sizeof(struct in_addr));
        }
        if (!mc_addr) {
            sinhim[1].sin_addr.s_addr &= htonl(0xFFFFFFFF);
            sinhim[1].sin_addr.s_addr |= htonl(HI_MC << 24);
        }
        if (setsockopt(fd[1], IPPROTO_IP, IP_MULTICAST_TTL,
            (void *)&multicast,
            sizeof(multicast)) < 0)
            err("setsockopt: IP_MULTICAST_TTL");
        if (brief <= 0) {
            inet_ntop(mc_af, &me.sin_addr.s_addr,
                multsrc, sizeof(multsrc));
            inet_ntop(mc_af, &sinhim[1].sin_addr.s_addr,
                multaddr, sizeof(multaddr));
            if (format & PARSE) {
                fprintf(stdout,
                    "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=0\n",
                    trans?"-t":"-r", ident,
                    multsrc, multaddr);
            }
        }
        else {

```

```

        fprintf(stdout,
            "nuttcp%s%s: sending from multicast source %s\n",
            trans?"-t":"-r", ident,
            multsrc);
        fprintf(stdout,
            "nuttcp%s%s: using asm on multicast group %s\n",
            trans?"-t":"-r", ident,
            multaddr);
    }
}
}
#ifdef AF_INET6
else if ((mc_af == AF_INET6) && !ssm) { /* IPv6 ASM */
/* The multicast transmitter just sends to mc group */
if (mc_addr) {
    struct sockaddr_in6 *user_group;

    user_group =
        (struct sockaddr_in6 *)mcre->ai_addr;
    bcopy((char *)&(user_group->sin6_addr),
        (char *)&sinhim6[1].sin6_addr,
        sizeof(struct in6_addr));
}
else if (client) {
    bcopy((char *)&me6.sin6_addr,
        (char *)&sinhim6[1].sin6_addr,
        sizeof(struct in6_addr));
}
else {
    bcopy((char *)&peer6.sin6_addr,
        (char *)&sinhim6[1].sin6_addr,
        sizeof(struct in6_addr));
}
if (!mc_addr) {
    bcopy((char *)&hi_mc6_asm,
        (char *)&sinhim6[1].sin6_addr,
        HI_MC6_ASM_LEN);
}
if (setsockopt(fd[1], IPPROTO_IPV6, IPV6_MULTICAST_HOPS,
    (void *)&multicast,
    sizeof(multicast)) < 0)
    err("setsockopt: IPV6_MULTICAST_HOPS");
if (brief <= 0) {
    inet_ntop(mc_af, &me6.sin6_addr.s6_addr,
        multsrc, sizeof(multsrc));
    inet_ntop(mc_af, &sinhim6[1].sin6_addr.s6_addr,
        multaddr, sizeof(multaddr));
    if (format & PARSE) {

```

```

    fprintf(stdout,
        "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=0\n",
        trans?"-t":"-r", ident,
        multsrc, multaddr);
}
else {
    fprintf(stdout,
        "nuttcp%s%s: sending from multicast source %s\n",
        trans?"-t":"-r", ident,
        multsrc);
    fprintf(stdout,
        "nuttcp%s%s: using asm on multicast group %s\n",
        trans?"-t":"-r", ident,
        multaddr);
}
}
}
#endif /* AF_INET6 */
#ifdef MCAST_JOIN_SOURCE_GROUP
else if ((mc_af == AF_INET) && ssm) { /* IPv4 SSM */
/* The multicast transmitter just sends to mc group */
if (mc_addr) {
    struct sockaddr_in *user_group;

    user_group =
        (struct sockaddr_in *)mcre->ai_addr;
    bcopy((char *)&(user_group->sin_addr.s_addr),
        (char *)&sinhim[1].sin_addr.s_addr,
        sizeof(struct in_addr));
}
else if (client) {
    bcopy((char *)&me.sin_addr.s_addr,
        (char *)&sinhim[1].sin_addr.s_addr,
        sizeof(struct in_addr));
}
else {
    bcopy((char *)&peer.sin_addr.s_addr,
        (char *)&sinhim[1].sin_addr.s_addr,
        sizeof(struct in_addr));
}
if (!mc_addr) {
    sinhim[1].sin_addr.s_addr &= htonl(0xFFFFFFFF);
    sinhim[1].sin_addr.s_addr |=
        htonl(HI_MC_SSM << 24);
}
if (setsockopt(fd[1], IPPROTO_IP, IP_MULTICAST_TTL,
    (void *)&multicast,
    sizeof(multicast)) < 0)

```



```

err("setsockopt: IP_MULTICAST_TTL");
if (brief <= 0) {
    inet_ntop(mc_af, &me.sin_addr.s_addr,
        multsrc, sizeof(multsrc));
    inet_ntop(mc_af, &sinhim[1].sin_addr.s_addr,
        multaddr, sizeof(multaddr));
    if (format & PARSE)
        fprintf(stdout,
            "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=1\n",
            trans?"-t":"-r", ident,
            multsrc, multaddr);
    else
        fprintf(stdout,
            "nuttcp%s%s: sending from multicast source %s\n",
            trans?"-t":"-r", ident,
            multsrc);
        fprintf(stdout,
            "nuttcp%s%s: using ssm on multicast group %s\n",
            trans?"-t":"-r", ident,
            multaddr);
    }
}
#ifdef AF_INET6
else if ((mc_af == AF_INET6) && ssm) { /* IPv6 SSM */
/* The multicast transmitter just sends to mc group */
if (mc_addr) {
    struct sockaddr_in6 *user_group;

    user_group =
        (struct sockaddr_in6 *)mcre->ai_addr;
    bcopy((char *)&(user_group->sin6_addr),
        (char *)&sinhim6[1].sin6_addr,
        sizeof(struct in6_addr));
    }
else if (client) {
    bcopy((char *)&me6.sin6_addr,
        (char *)&sinhim6[1].sin6_addr,
        sizeof(struct in6_addr));
    }
else {
    bcopy((char *)&peer6.sin6_addr,
        (char *)&sinhim6[1].sin6_addr,
        sizeof(struct in6_addr));
    }
if (!mc_addr) {
    bcopy((char *)&hi_mc6,
        (char *)&sinhim6[1].sin6_addr,
        HI_MC6_LEN);
}

```

```

}
if (setsockopt(fd[1], IPPROTO_IPV6, IPV6_MULTICAST_HOPS,
              (void *)&multicast,
              sizeof(multicast)) < 0)
    err("setsockopt: IPV6_MULTICAST_HOPS");
if (brief <= 0) {
    inet_ntop(mc_af, &me6.sin6_addr.s6_addr,
              multsrc, sizeof(multsrc));
    inet_ntop(mc_af, &sinhim6[1].sin6_addr.s6_addr,
              multaddr, sizeof(multaddr));
    if (format & PARSE)
        fprintf(stdout,
                "nuttcp%s%s: multicast_source=%s multicast_group=%s ssm=1\n",
                trans?"-t":"-r", ident,
                multsrc, multaddr);
    else
        fprintf(stdout,
                "nuttcp%s%s: sending from multicast source %s\n",
                trans?"-t":"-r", ident,
                multsrc);
        fprintf(stdout,
                "nuttcp%s%s: using ssm on multicast group %s\n",
                trans?"-t":"-r", ident,
                multaddr);
    }
}
#endif /* AF_INET6 */
#endif /* MCAST_JOIN_SOURCE_GROUP */
else {
    err("unsupported AF");
}
}

if (mcred) {
    freeaddrinfo(mcred);
    mcred = NULL;
}
}

if (trans && timeout) {
    itimer.it_value.tv_sec = timeout;
    itimer.it_value.tv_usec =
        (timeout - itimer.it_value.tv_sec)*1000000;
    itimer.it_interval.tv_sec = 0;
    itimer.it_interval.tv_usec = 0;
    signal(SIGALRM, sigalarm);
    if (!udp)
        setitimer(ITIMER_REAL, &itimer, 0);
}

```

```

}
else if (!trans && interval) {
    sigact.sa_handler = &sigalarm;
    sigemptyset(&sigact.sa_mask);
    sigact.sa_flags = SA_RESTART;
    sigaction(SIGALRM, &sigact, 0);
    itimer.it_value.tv_sec = interval;
    itimer.it_value.tv_usec =
        (interval - itimer.it_value.tv_sec)*1000000;
    itimer.it_interval.tv_sec = interval;
    itimer.it_interval.tv_usec =
        (interval - itimer.it_interval.tv_sec)*1000000;
    setitimer(ITIMER_REAL, &itimer, 0);
    if (clientserver) {
        chk_idle_data = (interval < idle_data_min) ?
            idle_data_min : interval;
        chk_idle_data = (chk_idle_data > idle_data_max) ?
            idle_data_max : chk_idle_data;
    }
}
else if (clientserver && !trans) {
    sigact.sa_handler = &sigalarm;
    sigemptyset(&sigact.sa_mask);
    sigact.sa_flags = SA_RESTART;
    sigaction(SIGALRM, &sigact, 0);
    if (timeout) {
        chk_idle_data = timeout/2;
    }
    else {
        if (rate != MAXRATE)
            chk_idle_data = (double)(nbuf*buflen)
                /rate/125/2;
        else
            chk_idle_data = default_idle_data;
    }
    chk_idle_data = (chk_idle_data < idle_data_min) ?
        idle_data_min : chk_idle_data;
    chk_idle_data = (chk_idle_data > idle_data_max) ?
        idle_data_max : chk_idle_data;
    itimer.it_value.tv_sec = chk_idle_data;
    itimer.it_value.tv_usec =
        (chk_idle_data - itimer.it_value.tv_sec)
            *1000000;
    itimer.it_interval.tv_sec = chk_idle_data;
    itimer.it_interval.tv_usec =
        (chk_idle_data - itimer.it_interval.tv_sec)
            *1000000;
    setitimer(ITIMER_REAL, &itimer, 0);
}

```

```

}

if (interval && clientserver && client && trans)
    do_poll = 1;

if (irate) {
    pkt_time = (double)buflen/rate/125;
    irate_pk_usec = pkt_time*1000000;
    irate_pk_nsec = (pkt_time*1000000 - irate_pk_usec)*1000;
    pkt_time_ms = pkt_time*1000;
}
prep_timer();
errno = 0;
stream_idx = 0;
ocorrection = 0;
correction = 0.0;
if (do_poll) {
    long flags;

    pollfds[0].fd = fileno(ctlconn);
    pollfds[0].events = POLLIN | POLLPRI;
    pollfds[0].revents = 0;
    for ( i = 1; i <= nstream; i++ ) {
        pollfds[i].fd = fd[i];
        pollfds[i].events = POLLOUT;
        pollfds[i].revents = 0;
    }
    flags = fcntl(0, F_GETFL, 0);
    if (flags < 0)
        err("fcntl 1");
    flags |= O_NONBLOCK;
    if (fcntl(0, F_SETFL, flags) < 0)
        err("fcntl 2");
}
if (sinkmode) {
    register int cnt = 0;
    if (trans) {
        if (udp) {
            strcpy(buf, "BOD0");
            if (multicast) {
                bcopy((char *)&sinhim[1].sin_addr.s_addr,
                    (char *)&save_mc.sin_addr.s_addr,
                    sizeof(struct in_addr));
                bcopy((char *)&save_sinhim.sin_addr.s_addr,
                    (char *)&sinhim[1].sin_addr.s_addr,
                    sizeof(struct in_addr));
            }
            (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* revr start */

```

```

if (two_bod) {
    usleep(250000);
    strcpy(buf, "BOD1");
    (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr start */
}
if (multicast) {
    bcopy((char *)&save_mc.sin_addr.s_addr,
        (char *)&sinhim[1].sin_addr.s_addr,
        sizeof(struct in_addr));
}
if (timeout)
    setitimer(ITIMER_REAL, &itimer, 0);
prep_timer();
}
bzero(buf + 8, 8); /* zero out timestamp */
nbytes += buflen;
if (do_poll && (format & DEBUGPOLL)) {
    fprintf(stdout, "do_poll is set\n");
    fflush(stdout);
}
if (udplossinfo)
    bcopy(&nbytes, buf + 24, 8);
if (!udp && interval && !(format & NORETRANS) &&
    (nstream == 1) &&
    ((retransinfo == 1) ||
    ((retransinfo >= 2) &&
    (force_retrans >= retransinfo)))) {
    uint32_t tmp;

    if (client) {
        if (send_retrans)
            do_retrans = 1;
        send_retrans = 0;
        if (!udp)
            bzero(buf + 24, 8);
    }
    else {
        if (retransinfo == 1)
            tmp = 0x5254524Eu; /* "RTRN" */
        else
            tmp = 0x48525452u; /* "HRTR" */
        bcopy(&nretrans[1], buf + 24, 4);
        bcopy(&tmp, buf + 28, 4);
        do_retrans = 0;
    }
}
else {
    send_retrans = 0;
}

```

```

do_retrans = 0;
if (!udp)
    bzero(buf + 24, 8);
}
if (nbuf == INT_MAX)
    nbuf = ULLONG_MAX;
if (!client) {
    /* check if client went away */
    pollfds[0].fd = fileno(ctlconn);
    save_events = pollfds[0].events;
    pollfds[0].events = POLLIN | POLLPRI;
    pollfds[0].revents = 0;
    if ((poll(pollfds, 1, 0) > 0) &&
        (pollfds[0].revents & (POLLIN | POLLPRI))) {
        nbuf = 0;
        intr = 1;
    }
    pollfds[0].events = save_events;
}
while (nbuf-- && ((cnt = Nwrite(fd[stream_idx + 1], buf, buflen)) == buflen) && !intr) {
    if (clientserver && ((nbuf & 0x3FF) == 0)) {
        if (!client) {
            /* check if client went away */
            pollfds[0].fd = fileno(ctlconn);
            save_events = pollfds[0].events;
            pollfds[0].events = POLLIN | POLLPRI;
            pollfds[0].revents = 0;
            if ((poll(pollfds, 1, 0) > 0)
                && (pollfds[0].revents &
                    (POLLIN | POLLPRI)))
                intr = 1;
            pollfds[0].events = save_events;
        }
        else if (handle_urg) {
            /* check for urgent TCP data
             * on control connection */
            pollfds[0].fd = fileno(ctlconn);
            save_events = pollfds[0].events;
            pollfds[0].events = POLLPRI;
            pollfds[0].revents = 0;
            if ((poll(pollfds, 1, 0) > 0)
                && (pollfds[0].revents &
                    POLLPRI)) {
                tmpbuf[0] = '\0';
                if ((recv(fd[0], tmpbuf, 1,
                    MSG_OOB) == -1) &&
                    (errno == EINVAL))
                    recv(fd[0], tmpbuf,

```

```

        1, 0);
    if (tmpbuf[0] == 'A')
        intr = 1;
    else
        err("recv urgent data");
    }
    pollfds[0].events = save_events;
    }
}
nbytes += buflen;
cnt = 0;
if (udplossinfo)
    bcopy(&nbytes, buf + 24, 8);
if (send_retrans) {
    nretrans[1] = get_retrans(
        fd[stream_idx + 1]);
    nretrans[1] -= iretrans[1];
    bcopy(&nretrans[1], buf + 24, 4);
}
stream_idx++;
stream_idx = stream_idx % nstream;
if (do_poll &&
    ((pollst = poll(pollfds, nstream + 1, 0))
    > 0) &&
    (pollfds[0].revents & (POLLIN | POLLPRI)) && !intr) {
    /* check for server output */
#ifdef DEBUG
    if (format & DEBUGPOLL) {
        fprintf(stdout, "got something %d: ", i);
        for ( i = 0; i < nstream + 1; i++) {
            if (pollfds[i].revents & POLLIN) {
                fprintf(stdout, " rfd %d",
                    pollfds[i].fd);
            }
            if (pollfds[i].revents & POLLPRI) {
                fprintf(stdout, " pfd %d",
                    pollfds[i].fd);
            }
            if (pollfds[i].revents & POLLOUT) {
                fprintf(stdout, " wfd %d",
                    pollfds[i].fd);
            }
            if (pollfds[i].revents & POLLERR) {
                fprintf(stdout, " xfd %d",
                    pollfds[i].fd);
            }
            if (pollfds[i].revents & POLLHUP) {
                fprintf(stdout, " hfd %d",

```

```

        pollfds[i].fd);
    }
    if (pollfds[i].revents & POLLNVAL) {
        fprintf(stdout, " nfd %d",
            pollfds[i].fd);
    }
    }
    fprintf(stdout, "\n");
    fflush(stdout);
    }
    if (format & DEBUGPOLL) {
        fprintf(stdout, "got server output: %s", intervalbuf);
        fflush(stdout);
    }
}

#endif

while (fgets(intervalbuf, sizeof(intervalbuf), stdin))
{
    if (strncmp(intervalbuf, "DONE", 4) == 0) {
        if (format & DEBUGPOLL) {
            fprintf(stdout, "got DONE\n");
            fflush(stdout);
        }
        got_done = 1;
        intr = 1;
        do_poll = 0;
        break;
    }
    else if (strncmp(intervalbuf, "nuttcp-r", 8) == 0) {
        if ((brief <= 0) ||
            strstr(intervalbuf,
                "Warning") ||
            strstr(intervalbuf,
                "Error") ||
            strstr(intervalbuf,
                "Debug")) {
            if (*ident) {
                fputs("nuttcp-r", stdout);
                fputs(ident, stdout);
                fputs(intervalbuf + 8, stdout);
            }
            else
                fputs(intervalbuf, stdout);
            fflush(stdout);
        }
    }
    else {
        if (*ident)
            fprintf(stdout, "%s: ", ident + 1);
    }
}

```



```

cp1 = intervalbuf +
    strlen(intervalbuf) - 1;
/* ugly kludge to get rid of
 * server "0 retrans" info at
 * start of transfer for small
 * interval reports -
 * hopefully it won't be
 * necessary to also check
 * at end of transfer when
 * processing server output */
if (!got_0retrans) {
    if (format & PARSE) {
        if ((cp2 = strstr(
            intervalbuf,
            "host-"
            "retrans")))
            *(cp2 - 1) = '\0';
        else if ((cp2 = strstr(
            intervalbuf,
            "retrans")))
            *(cp2 - 1) = '\0';
        else {
            *cp1 = '\0';
            got_0retrans = 1;
        }
    }
    else {
        if (strstr(intervalbuf,
            "host-retrans"))
            *(cp1 - 19) = '\0';
        else if (strstr(
            intervalbuf,
            "retrans"))
            *(cp1 - 14) = '\0';
        else {
            *cp1 = '\0';
            got_0retrans = 1;
        }
    }
}
else {
    *cp1 = '\0';
}
if (do_retrans) {
    cp1 = strstr(intervalbuf,
        "Mbps") + 4;
    ch = '\0';
    if (cp1) {

```

```

    if (format & PARSE) {
        cp1 = strchr(cp1,
            '.');
        if (cp1)
            cp1 += 5;
    }
    ch = *cp1;
}
if (ch)
    *cp1 = '\0';
}
fputs(intervalbuf, stdout);
if (do_retrans && sinkmode) {
    nretrans[1] =
        get_retrans(fd[stream_idx
            + 1]);
    nretrans[1] -= iretrans[1];
    if (format & PARSE)
        fprintf(stdout,
            P_RETRANS_FMT_INTERVAL,
            (retransinfo == 1) ?
                "" : "host-",
            (nretrans[1] -
                pretrans));
    else
        fprintf(stdout,
            RETRANS_FMT_INTERVAL,
            (nretrans[1] -
                pretrans),
            (retransinfo == 1) ?
                "" : "host-");
    pretrans = nretrans[1];
}
if (do_retrans && cp1 && ch) {
    *cp1 = ch;
    fputs(cp1, stdout);
}
fprintf(stdout, "\n");
fflush(stdout);
}
}
}
if (do_poll && (pollst < 0)) {
    if (errno == EINTR)
        break;
    err("poll");
}
}
}

```

```

nbytes -= buflen;
if (intr && (cnt > 0))
    nbytes += cnt;
if (udp) {
    if (multicast)
        bcopy((char *)&save_sinhim.sin_addr.s_addr,
              (char *)&sinhim[1].sin_addr.s_addr,
              sizeof(struct in_addr));
        strcpy(buf, "EOD0");
        (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr end */
    }
} else {
    first_read = 1;
    first_jitter = 1;
    first_jitteri = 1;
    nowd = 0;
    nowdi = 0;
    owd_min = 1000000.0;
    owd_mini = 1000000.0;
    owd_max = -1000000.0;
    owd_maxi = -1000000.0;
    owd_avg = 0.0;
    owd_avgi = 0.0;
    need_swap = 0;
    bzero(buf + 24, 8);
    if (udp) {
        ntbytesc = 0;
        got_eod0 = 0;
        while (((cnt=Nread(fd[stream_idx + 1], buf, buflen)) > 0) && !intr) {
            if (cnt <= 4) {
                if (strncmp(buf, "EOD0", 4) == 0) {
                    gettimeofday(&time_eod0,
                                (struct timezone *)0);
                    got_eod0 = 1;
                    done = 1;
                    continue;
                }
                if (strncmp(buf, "EOD", 3) == 0) {
                    ocorrection = buf[3] - '0';
                    gettimeofday(&time_eod,
                                (struct timezone *)0);
                    done = 1;
                    break; /* "EOF" */
                }
            }
            if (strncmp(buf, "BOD", 3) == 0) {
                if (two_bod &&
                    (buf[3] == '0'))
                    continue;
            }
        }
    }
}

```

```

    if (interval)
        setitimer(ITIMER_REAL,
            &timer, 0);
        prep_timer();
        got_begin = 1;
        continue;
    }
    break;
}
else if (!got_begin) {
    if (interval)
        setitimer(ITIMER_REAL,
            &timer, 0);
        prep_timer();
        got_begin = 1;
    }
else if (got_eod0) {
    /* got data after EOD0, so
     * extend EOD0 time */
    gettimeofday(&time_eod0,
        (struct timezone *)0);
}
if (!got_begin)
    continue;
nbytes += cnt;
cnt = 0;
/* problematic if the interval timer
 * goes off right here */
if (udplossinfo) {
    if (first_read) {
        bcopy(buf + 24, &ntbytesc,
            8);
        first_read = 0;
        if (ntbytesc > 0x100000000ull)
            need_swap = 1;
        if (!need_swap) {
            stream_idx++;
            stream_idx =
                stream_idx
                    % nstream;
            continue;
        }
    }
}
if (!need_swap)
    bcopy(buf + 24, &ntbytesc,
        8);
else {
    cp1 = (char *)&ntbytesc;

```

```

        cp2 = buf + 31;
        for ( i = 0; i < 8; i++ )
            *cp1++ = *cp2--;
    }
}
if (do_jitter) {
    if (first_jitter) {
        gettimeofday(
            &timepkr,
            (struct timezone *)0);
        timepkri = timepkr;
        first_jitter = 0;
        first_jitteri = 0;
        ntbytescp = ntbytesc;
        ntbytescpi = ntbytesc;
        jitter = 0.0;
        jitteri = 0.0;
        njitter = 0;
        njitteri = 0;
        jitter_min = 1000000.0;
        jitter_mini = 1000000.0;
        jitter_max = -1000000.0;
        jitter_maxi = -1000000.0;
        jitter_avg = 0.0;
        jitter_avgi = 0.0;
#ifdef DEBUG
        if (clientserver &&
            client &&
            (format & DEBUGJITTER))
            fprintf(stdout,
                "pkt_time_ms"
                " = %6.3f ms\n",
                pkt_time_ms);
#endif

        stream_idx++;
        stream_idx =
            stream_idx % nstream;
        continue;
    }
    /* formula for jitter is from
    * RFC1889 - note synchronized
    * clocks are not required since
    * source packet delta time is
    * known (pkt_time_ms)
    *
    *  $D(i,j) = (R_j - R_i) - (S_j - S_i)$ 
    *  $= (R_j - S_j) - (R_i - S_i)$ 
    *  $J = J + (|D(i-1,i)| - J) / 16$ 

```

```

*
* for nuttcp we just use the raw
* absolute value of the delta
*
* J=|D(i-1,i)|
*/

if (!do_owd) {
gettimeofday(&timerx,
(struct timezone *)0);
}
if (do_jitter & JITTER_IGNORE_OOO) {
/* first check that packet
* is next in sequence */
if (udplossinfo &&
(ntbytescp + buflen)
!= ntbytesc) {
ntbytescp = ntbytesc;
ntbytescpi = ntbytesc;
timepkr = timerx;
timepkri = timerx;
stream_idx++;
stream_idx =
stream_idx % nstream;
continue;
}
}

tvsub( &timed, &timerx, &timepkr );
pkt_delta =
timed.tv_sec*1000
+ ((double)timed.tv_usec)
/ 1000;
pkt_delta -= pkt_time_ms;
if (pkt_delta >= 0)
jitter = pkt_delta;
else
jitter = -pkt_delta;
njitter++;
if (jitter < jitter_min)
jitter_min = jitter;
if (jitter > jitter_max)
jitter_max = jitter;
jitter_avg += jitter;
#ifdef DEBUG
if (clientserver && client &&
(format & DEBUGJITTER))
fprintf(stdout,

```

```

        "pkt_delta = %6.3f ms, "
        "jitter = %9.6f ms\n",
        pkt_delta, jitter);
#endif

timepkr = timerx;
ntbytescp = ntbytesc;
if (!interval) {
    stream_idx++;
    stream_idx =
    stream_idx % nstream;
    continue;
}
if (first_jitteri) {
    gettimeofday(
    &timepkri,
    (struct timezone *)0);
    first_jitteri = 0;
    ntbytescpi = ntbytesc;
    jitteri = 0.0;
    njitteri = 0;
    jitter_mini = 1000000.0;
    jitter_maxi = -1000000.0;
    jitter_avgi = 0.0;
    stream_idx++;
    stream_idx =
    stream_idx % nstream;
    continue;
}
tvsub( &timed, &timerx, &timepkri );
pkt_delta =
timed.tv_sec*1000
+ ((double)timed.tv_usec)
/ 1000;
pkt_delta -= pkt_time_ms;
if (pkt_delta >= 0)
    jitteri = pkt_delta;
else
    jitteri = -pkt_delta;
njitteri++;
if (jitteri < jitter_mini)
    jitter_mini = jitteri;
if (jitteri > jitter_maxi)
    jitter_maxi = jitteri;
jitter_avgi += jitteri;
timepkri = timerx;
ntbytescpi = ntbytesc;
}
stream_idx++;

```

```

    stream_idx = stream_idx % nstream;
}
if (intr && (cnt > 0))
    nbytes += cnt;
if (got_eod0) {
    tvsub( &timed, &time_eod, &time_eod0);
    correction = timed.tv_sec +
        ((double)timed.tv_usec)
        / 1000000;
}
} else {
while (((cnt=Nread(fd[stream_idx + 1], buf, buflen)) > 0) && !intr) {
    nbytes += cnt;
    cnt = 0;
    if (first_read) {
    if (interval && !(format & NORETRANS)) {
        uint32_t tmp;

        first_read = 0;
        bcopy(buf + 24, &nretrans[1], 4);
        bcopy(buf + 28, &tmp, 4);
        if (tmp == 0x5254524Eu) {
            /* "RTRN" */
            retransinfo = 1;
            b_flag = 1;
        }
        else if (tmp == 0x48525452u) {
            /* "HRTR" */
            retransinfo = 2;
            b_flag = 1;
        }
        else if (tmp == 0x4E525452u) {
            /* "NRTR" */
            need_swap = 1;
            retransinfo = 1;
            b_flag = 1;
        }
        else if (tmp == 0x52545248u) {
            /* "RTRH" */
            need_swap = 1;
            retransinfo = 2;
            b_flag = 1;
        }
        else {
            retransinfo = -1;
            read_retrans = 0;
        }
    }
}
}
}

```



```

else
    read_retrans = 0;
}
if (read_retrans) {
    if (!need_swap)
        bcopy(buf + 24,
            &nretrans[1], 4);
    else {
        cp1 = (char *)&nretrans[1];
        cp2 = buf + 27;
        for (i = 0; i < 4; i++)
            *cp1++ = *cp2--;
    }
}
stream_idx++;
stream_idx = stream_idx % nstream;
}
if (intr && (cnt > 0))
    nbytes += cnt;
}
}
} else {
    register int cnt;
    if (trans) {
#ifdef linux
        struct stat instat;

        if (fstat(savestdin, &instat) == 0) {
            if (!S_ISREG(instat.st_mode)) {
                zerocopy = 0;
                directio = 0;
            }
        }
        else {
            zerocopy = 0;
            directio = 0;
        }

        if (directio) {
            flags = fcntl(savestdin, F_GETFL, 0);
            if (flags < 0)
                errmes("fcntl get O_DIRECT");
            else {
                flags |= O_DIRECT;
                if (fcntl(savestdin,
                    F_SETFL, flags) < 0)
                    errmes("fcntl set O_DIRECT");
            }
        }

```

```

}

if (zerocopy) {
    while (nbuf-- &&
           ((cnt=sendfile(fd[stream_idx + 1],
                         savestdin,
                         (off_t *)&nbytes,
                         buflen)) > 0)) {
        cnt = 0;
        stream_idx++;
        stream_idx = stream_idx % nstream;
    }
}
else
#endif
{
    while (nbuf-- &&
           ((cnt=read(savestdin, buf, buflen)) > 0) &&
           (Nwrite(fd[stream_idx + 1], buf, cnt)
            == cnt)) {
        nbytes += cnt;
        cnt = 0;
        stream_idx++;
        stream_idx = stream_idx % nstream;
    }
}
if (udp) {
    strcpy(buf, "EOD0");
    (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr end */
}
} else {
#ifdef linux
    struct stat outstat;

    if (fstat(savestdout, &outstat) == 0) {
        if (!S_ISREG(outstat.st_mode))
            directio = 0;
    }
    else
        directio = 0;

    if (directio) {
        flags = fcntl(savestdout, F_GETFL, 0);
        if (flags < 0)
            errmes("fcntl get O_DIRECT");
        else {
            flags |= O_DIRECT;
            if (fcntl(savestdout,

```

```

        F_SETFL, flags) < 0)
        errmes("fcntl set O_DIRECT");
    }
}
#endif
while ((cnt=Nread(fd[stream_idx + 1], buf, buflen)) > 0 &&
((cnt != 4) || strcmp(buf, "EOD", 3) != 0) &&
mwrite(savestdout, buf, cnt,
cnt != buflen) == cnt) {
    nbytes += cnt;
    cnt = 0;
    stream_idx++;
    stream_idx = stream_idx % nstream;
}
}
}
if (errno && (errno != EAGAIN)) {
    if ((errno != EINTR) &&
#ifdef ERESTART
        (errno != ERESTART) &&
#endif
        (!clientserver || client)) err("IO");
}
itimer.it_value.tv_sec = 0;
itimer.it_value.tv_usec = 0;
itimer.it_interval.tv_sec = 0;
itimer.it_interval.tv_usec = 0;
setitimer(ITIMER_REAL, &itimer, 0);
done = 1;
(void)read_timer(stats, sizeof(stats));
if (udp&&trans) {
    usleep(500000);
    strcpy(buf, "EOD1");
    (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr end */
    stream_idx++;
    stream_idx = stream_idx % nstream;
    usleep(500000);
    strcpy(buf, "EOD2");
    (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr end */
    stream_idx++;
    stream_idx = stream_idx % nstream;
    usleep(500000);
    strcpy(buf, "EOD3");
    (void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr end */
    stream_idx++;
    stream_idx = stream_idx % nstream;
    usleep(500000);
    strcpy(buf, "EOD4");
}

```

```

(void)Nwrite( fd[stream_idx + 1], buf, 4 ); /* rcvr end */
stream_idx++;
stream_idx = stream_idx % nstream;
}

if (!udp && trans && (format & DEBUGRETRANS)) {
    sretrans = get_retrans(-1);
    fprintf(stdout, "before closing system retrans = %d\n",
        sretrans);
}

#ifdef DEBUG
if (clientserver && client && !trans && do_jitter && njitter &&
    (format & DEBUGJITTER)) {
    fprintf(stdout, "njitter = %lld\n", njitter);
    fprintf(stdout, "jitter_min = %9.6f ms\n", jitter_min);
    fprintf(stdout, "jitter_max = %9.6f ms\n", jitter_max);
    fprintf(stdout, "jitter_avg = %9.6f ms\n", jitter_avg/njitter);
}
#endif

for ( stream_idx = 1; stream_idx <= nstream; stream_idx++ ) {
    if (!udp && trans) {
#ifdef defined(linux) && defined(TCPI_OPT_TIMESTAMPS) && !defined(BROKEN_UNACKED)
        /* if -DBROKEN_UNACKED skip check for unACKed data
         * (workaround motivated by possible bug encountered
         * on a Suse Linux 10.1 system)
         */
        struct timeval timeunsent, timec, timed;
        double xmitrate;
        int unsent, xmitunsent;
        long flags;

        optlen = sizeof(tcpinf);
        if (getsockopt(fd[stream_idx], SOL_TCP, TCP_INFO,
            (void *)&tcpinf, &optlen) < 0) {
            mes("couldn't collect TCP info\n");
            retransinfo = -1;
        }
        if (ioctl(fd[stream_idx], SIOCOUTQ, &unsent) < 0) {
            mes("couldn't get SIOCOUTQ value\n");
            unsent = -1;
        }
        gettimeofday(&timeunsent, (struct timezone *)0);
        reald = 0.0;
        xmitrate = ((double)nbytes-(double)unsent)/reald;
        xmitunsent = (double)unsent/xmitrate;
        xmitunsent = 2*xmitunsent + MAX_EOT_WAIT_SEC;

```

```

if (clientserver && client) {
    reading_srvr_info = 1;
    pollfds[0].fd = fileno(ctlconn);
    pollfds[0].events = POLLIN | POLLPRI;
    pollfds[0].revents = 0;
    flags = fcntl(0, F_GETFL, 0);
    if (flags < 0)
        err("fcntl 1");
    flags |= O_NONBLOCK;
    if (fcntl(0, F_SETFL, flags) < 0)
        err("fcntl 2");
    itimer.it_value.tv_sec = xmitunsent + 10;
    itimer.it_value.tv_usec = 0;
    itimer.it_interval.tv_sec = 0;
    itimer.it_interval.tv_usec = 0;
    setitimer(ITIMER_REAL, &itimer, 0);
}
while ((unsent > 0) && (reald < xmitunsent)) {
    if (clientserver && client &&
        ((pollst = poll(pollfds, 1, 0)) > 0) &&
        (pollfds[0].revents & (POLLIN | POLLPRI)) &&
        !got_done) {
        /* check for server output */
        while (fgets(intervalbuf,
            sizeof(intervalbuf), stdin))
        {
            setitimer(ITIMER_REAL, &itimer, 0);
            gettimeofday(&timeunsent,
                (struct timezone *)0);
            if (strncmp(intervalbuf, "DONE", 4)
                == 0) {
                if (format & DEBUGPOLL) {
                    fprintf(stdout,
                        "got DONE\n");
                    fflush(stdout);
                }
                got_done = 1;
                intr = 1;
                break;
            }
        }
        else if (strncmp(intervalbuf,
            "nuttcp-", 7) == 0) {
            if ((brief <= 0) ||
                strstr(intervalbuf,
                    "Warning") ||
                strstr(intervalbuf,
                    "Error") ||
                strstr(intervalbuf,

```

```

        "Debug")) {
    if (*ident) {
        fputs("nuttcp",
            stdout);
        fputs(trans ?
            "-r" : "-t",
            stdout);
        fputs(ident,
            stdout);
        fputs(intervalbuf
            + 8,
            stdout);
    }
    else
        fputs(intervalbuf,
            stdout);
    fflush(stdout);
}
if (strstr(intervalbuf,
    "Error"))
    exit(1);
}
else {
    if (*ident)
        fprintf(stdout, "%s: ",
            ident + 1);
    intervalbuf[strlen(intervalbuf)
        - 1] = '\0';
    if (do_retrans) {
        cp1 = strstr(intervalbuf,
            "Mbps") + 4;
        ch = '\0';
        if (cp1) {
            if (format & PARSE) {
                cp1 = strchr(cp1,
                    ':');
                if (cp1)
                    cp1 += 5;
            }
            ch = *cp1;
        }
        if (ch)
            *cp1 = '\0';
    }
    fputs(intervalbuf, stdout);
    if (do_retrans && sinkmode &&
        (nstream == 1)) {
        nretrans[1] =

```

```

        get_retrans(
            fd[stream_idx]);
    nretrans[1] -= iretrans[1];
    if (format & PARSE)
    fprintf(stdout,
        P_RETRANS_FMT_INTERVAL,
        (retransinfo == 1) ?
        "" : "host-",
        (nretrans[1]
        - pretrans));
    else
    fprintf(stdout,
        RETRANS_FMT_INTERVAL,
        (nretrans[1]
        - pretrans),
        (retransinfo == 1) ?
        "" : "host-");
    pretrans =
    nretrans[1];
}
if (do_retrans && cp1 && ch) {
    *cp1 = ch;
    fputs(cp1, stdout);
}
fprintf(stdout, "\n");
fflush(stdout);
}
}
}
if (format & DEBUGRETRANS)
    print_tcpinfo();
if (format & DEBUGRETRANS)
    usleep(100000);
else
    usleep(1000);
optlen = sizeof(tcpinfo);
if (getsockopt(fd[stream_idx],
    SOL_TCP, TCP_INFO,
    (void *)&tcpinfo, &optlen) < 0) {
    mes("couldn't collect TCP info\n");
    retransinfo = -1;
}
if (ioctl(fd[stream_idx], SIOCCOUTQ,
    &unsent) < 0) {
    mes("couldn't get SIOCCOUTQ value\n");
    unsent = -1;
}
gettimeofday(&timec, (struct timezone *)0);

```

```

    tvsub(&timed, &timec, &timeunsent);
    reatld = timed.tv_sec
        + ((double)timed.tv_usec) / 1000000;
}
if (clientserver && client) {
    reading_srvr_info = 0;
    flags = fcntl(0, F_GETFL, 0);
    if (flags < 0)
        err("fcntl 1");
    flags &= ~O_NONBLOCK;
    if (fcntl(0, F_SETFL, flags) < 0)
        err("fcntl 2");
    itimer.it_value.tv_sec = 0;
    itimer.it_value.tv_usec = 0;
    setitimer(ITIMER_REAL, &itimer, 0);
}

if (getsockopt(fd[stream_idx], SOL_TCP, TCP_INFO,
    (void *)&tcpinf, &optlen) < 0) {
    mes("couldn't collect TCP info\n");
    retransinfo = -1;
}
if (unsent > 0) {
    /* assume receiver went away */
    if (clientserver && client) {
        mes("Error: timeout while draining "
            "socket send queue");
        exit(1);
    }
    goto cleanup;
}

if (format & DEBUGRETRANS)
    print_tcpinfo();
#endif
if (retransinfo > 0) {
    if ((stream_idx == 1) || (retransinfo == 1)) {
        nretrans[stream_idx] =
            get_retrans(fd[stream_idx]);
        nretrans[stream_idx] -=
            iretrans[stream_idx];
    }
}
}
}
if (!ludp && trans && (format & DEBUGRETRANS)) {
    sretrans = get_retrans(-1);
    fprintf(stdout, "after closing system retrans = %d\n",

```



```

        sretrans);
    }

    if (interval && clientserver && client && do_retrans && !got_done) {
        /* don't fully close data channels yet since there
         * may be some straggler interval reports to which we
         * will need to append retrans info, so just shutdown()
         * for writing for now */
        for ( stream_idx = 1; stream_idx <= nstream; stream_idx++ )
            shutdown(fd[stream_idx], SHUT_WR);
    }
    else
        close_data_channels();

    if (interval && clientserver && !client && !trans) {
        fprintf(stdout, "DONE\n");
        fflush(stdout);
    }

    if (cput <= 0.0) cput = 0.000001;
    if (realt <= 0.0) realt = 0.000001;

    if (udp && !trans) {
        if (got_eod0)
            realt -= correction;
        else
            realt -= ocorrection * 0.5;
    }

    sprintf(srvrbuf, "%.4f", (double)nbytes/1024/1024);
    sscanf(srvrbuf, "%lf", &MB);

    if (clientserver && client)
        reading_srvr_info = 1;

    if (interval && clientserver && client && trans && !got_done) {
        long flags;

        if (format & DEBUGPOLL) {
            fprintf(stdout, "getting rest of server output\n");
            fflush(stdout);
        }
        flags = fcntl(0, F_GETFL, 0);
        if (flags < 0)
            err("fcntl 3");
        flags &= ~O_NONBLOCK;
        if (fcntl(0, F_SETFL, flags) < 0)
            err("fcntl 4");
    }

```

```

itimer.it_value.tv_sec = SRVR_INFO_TIMEOUT;
itimer.it_value.tv_usec = 0;
itimer.it_interval.tv_sec = 0;
itimer.it_interval.tv_usec = 0;
setitimer(ITIMER_REAL, &itimer, 0);
while (fgets(intervalbuf, sizeof(intervalbuf), stdin)) {
    setitimer(ITIMER_REAL, &itimer, 0);
    if (strncmp(intervalbuf, "DONE", 4) == 0) {
        if (format & DEBUGPOLL) {
            fprintf(stdout, "got DONE 2\n");
            fflush(stdout);
        }
        break;
    }
    if (!(strstr(intervalbuf, " MB / ") ||
        strstr(intervalbuf, " sec = ") && (brief > 0))
        continue;
    if (*ident)
        fprintf(stdout, "%s: ", ident + 1);
    intervalbuf[strlen(intervalbuf) - 1] = '\0';
    if (do_retrans) {
        cp1 = strstr(intervalbuf, "Mbps") + 4;
        ch = '\0';
        if (cp1) {
            if (format & PARSE) {
                cp1 = strchr(cp1, '.');
                if (cp1)
                    cp1 += 5;
            }
            ch = *cp1;
        }
        if (ch)
            *cp1 = '\0';
    }
    fputs(intervalbuf, stdout);
    if (do_retrans && sinkmode) {
        nretrans[1] = get_retrans(fd[1]);
        nretrans[1] -= iretrans[1];
        if (format & PARSE)
            fprintf(stdout, P_RETRANS_FMT_INTERVAL,
                (retransinfo == 1) ?
                "" : "host-",
                (nretrans[1] - pretrans));
        else
            fprintf(stdout, RETRANS_FMT_INTERVAL,
                (nretrans[1] - pretrans),
                (retransinfo == 1) ?
                "" : "host-");
    }
}

```

```

    pretrans = nretrans[1];
}
if (do_retrans && cp1 && ch) {
    *cp1 = ch;
    fputs(cp1, stdout);
}
fprintf(stdout, "\n");
fflush(stdout);
}
itimer.it_value.tv_sec = 0;
itimer.it_value.tv_usec = 0;
setitimer(ITIMER_REAL, &itimer, 0);
}

if (interval && clientserver && client && do_retrans) {
    /* it's OK to fully close the data channels now */
    close_data_channels();
}

if (clientserver && client) {
    itimer.it_value.tv_sec = SRVR_INFO_TIMEOUT;
    itimer.it_value.tv_usec = 0;
    setitimer(ITIMER_REAL, &itimer, 0);
    cp1 = srvrbuf;
    got_svr_retrans = 0;
    while (fgets(cp1, sizeof(svrbuf) - (cp1 - srvrbuf), stdin)) {
        setitimer(ITIMER_REAL, &itimer, 0);
        if (*(cp1 + strlen(cp1) - 1) != '\n') {
            *cp1 = '\0';
            break;
        }
        if (strstr(cp1, "real") && strstr(cp1, "seconds")) {
            strcpy(fmt, "nuttcp-%*c: ");
            if (format & PARSE)
                strcat(fmt, P_PERF_FMT_IN);
            else
                strcat(fmt, PERF_FMT_IN);
            sscanf(cp1, fmt,
                &svr_MB, &svr_realt, &svr_KBps,
                &svr_Mbps);
            if (trans && udp) {
                strncpy(tmpbuf, cp1, 256);
                *(tmpbuf + 256) = '\0';
                if (strncmp(tmpbuf,
                    "nuttcp-r", 8) == 0)
                    sprintf(cp1, "nuttcp-r%s%s",
                        ident, tmpbuf + 8);
                cp1 += strlen(cp1);
            }
        }
    }
}

```

```

cp2 = cp1;
sprintf(cp2, "nuttcp-r:");
cp2 += 9;
if (format & PARSE)
    strcpy(fmt, P_DROP_FMT);
else
    strcpy(fmt, DROP_FMT);
sprintf(cp2, fmt,
        (int64_t)((MB - srvr_MB)
        * 1024 * 1024)
        / buflen + 0.5),
        (uint64_t)(MB * 1024 * 1024)
        / buflen + 0.5);
cp2 += strlen(cp2);
fractloss = ((MB != 0.0) ?
    1 - srvr_MB / MB : 0.0);
if (format & PARSE)
    strcpy(fmt, P_LOSS_FMT);
else if ((fractloss != 0.0) &&
    (fractloss < 0.001))
    strcpy(fmt, LOSS_FMT5);
else
    strcpy(fmt, LOSS_FMT);
sprintf(cp2, fmt, fractloss * 100);
cp2 += strlen(cp2);
sprintf(cp2, "\n");
}
}
else if (strstr(cp1, "sys")) {
    strcpy(fmt, "nuttcp-%*c: ");
    if (format & PARSE) {
        strcat(fmt, "stats=cpu ");
        strcat(fmt, P_CPU_STATS_FMT_IN2);
    }
    else
        strcat(fmt, CPU_STATS_FMT_IN2);
    if (sscanf(cp1, fmt,
        &srvr_cpu_util) != 7) {
        strcpy(fmt, "nuttcp-%*c: ");
        if (format & PARSE) {
            strcat(fmt, "stats=cpu ");
            strcat(fmt,
                P_CPU_STATS_FMT_IN);
        }
    }
    else
        strcat(fmt, CPU_STATS_FMT_IN);
    sscanf(cp1, fmt,
        &srvr_cpu_util);
}

```

```

    }
}
else if ((cp2 = strstr(cp1, "retrans"))) {
    got_srvr_retrans = 1;
    retransinfo = 1;
    if (strstr(cp1, "host-retrans"))
        retransinfo = 2;
    if (format & PARSE)
        sscanf(cp2, P_RETRANS_FMT_IN,
            &total_retrans);
    else
        sscanf(cp2, RETRANS_FMT_IN,
            &total_retrans);
    if (format & PARSE) {
        if ((cp2 = strstr(cp2,
            "retrans_by_stream=")))
            cp2 += 18;
        else
            cp2 = NULL;
    }
    else {
        if ((cp2 = strstr(cp2, "( ")))
            cp2 += 2;
        else
            cp2 = NULL;
    }
    if (cp2) {
        sscanf(cp2, "%d", &nretrans[1]);
        stream_idx = 2;
        while ((stream_idx <= nstream) &&
            (cp2 = strchr(cp2, '+'))) {
            cp2++;
            sscanf(cp2, "%d",
                &nretrans[stream_idx]);
            stream_idx++;
        }
    }
    /* below is for compatibility with 6.0.x beta */
    if ((cp2 = strstr(cp1, "RTT"))) {
        if (format & PARSE)
            sscanf(cp2, P_RTT_FMT_IN, &rtt);
        else
            sscanf(cp2, RTT_FMT_INB, &rtt);
    }
}
else if ((cp2 = strstr(cp1, "RTT")) ||
    (cp2 = strstr(cp1, "rtt"))) {
    if (format & PARSE)

```

```

        sscanf(cp2, P_RTT_FMT_IN, &rtt);
    else
        sscanf(cp2, RTT_FMT_IN, &rtt);
}
else if ((cp2 = strstr(cp1, "jitter"))) {
    if (format & PARSE)
        sscanf(cp2, P_JITTER_FMT_IN,
            &jitter_min, &jitter_avg,
            &jitter_max);
    else
        sscanf(cp2, JITTER_FMT_IN,
            &jitter_min, &jitter_avg,
            &jitter_max);
    njitter = 1;
}
else if ((cp2 = strstr(cp1, "OWD"))) {
    if (format & PARSE)
        sscanf(cp2, P_OWD_FMT_IN,
            &owd_min, &owd_avg, &owd_max);
    else
        sscanf(cp2, OWD_FMT_IN,
            &owd_min, &owd_avg, &owd_max);
    nowd = 1;
}
else if ((strstr(cp1, "KB/cpu")) && !verbose)
    continue;
strncpy(tmpbuf, cp1, 256);
*(tmpbuf + 256) = '\0';
if (strncmp(tmpbuf, "nuttcp-", 7) == 0)
    sprintf(cp1, "nuttcp-%c%s%s",
        tmpbuf[7], ident, tmpbuf + 8);
if ((strstr(cp1, "Warning") ||
    strstr(cp1, "Error") ||
    strstr(cp1, "Debug"))
    && (brief > 0)) {
    fputs(cp1, stdout);
    fflush(stdout);
}
cp1 += strlen(cp1);
}
itimer.it_value.tv_sec = 0;
itimer.it_value.tv_usec = 0;
setitimer(ITIMER_REAL, &itimer, 0);
got_srvr_output = 1;
if (!udp && !trans && !got_srvr_retrans)
    retransinfo = -1;
}

```

```

if (!udp && trans && (retransinfo > 0)) {
    total_retrans = 0;
    for ( stream_idx = 1; stream_idx <= nstream; stream_idx++ ) {
        total_retrans += nretrans[stream_idx];
    }
}

if (brief <= 0) {
    strcpy(fmt, "nuttcp%s%s: ");
    if (format & PARSE)
        strcat(fmt, P_PERF_FMT_OUT);
    else
        strcat(fmt, PERF_FMT_OUT);
    fprintf(stdout, fmt, trans?"-t":"-r", ident,
        (double)nbytes/(1024*1024), reall,
        (double)nbytes/reall/1024,
        (double)nbytes/reall/125000);
    if (clientserver && client && !trans && udp) {
        fprintf(stdout, "nuttcp-r%s:", ident);
        if (format & PARSE)
            strcpy(fmt, P_DROP_FMT);
        else
            strcpy(fmt, DROP_FMT);
        fprintf(stdout, fmt,
            (int64_t)((svr_MB - MB)*1024*1024)
            /buflen + 0.5),
            (uint64_t)((svr_MB*1024*1024)/buflen + 0.5));
        fractloss = ((svr_MB != 0.0) ? 1 - MB/svr_MB : 0.0);
        if (format & PARSE)
            strcpy(fmt, P_LOSS_FMT);
        else if ((fractloss != 0.0) && (fractloss < 0.001))
            strcpy(fmt, LOSS_FMT5);
        else
            strcpy(fmt, LOSS_FMT);
        fprintf(stdout, fmt, fractloss * 100);
        fprintf(stdout, "\n");
    }
    if (clientserver && udp && !trans && do_jitter && njitter) {
        strcpy(fmt, "nuttcp%s%s: ");
        if (format & PARSE)
            strcat(fmt, P_JITTER_FMT);
        else
            strcat(fmt, JITTER_FMT);
        fprintf(stdout, fmt, trans?"-t":"-r", ident,
            jitter_min, jitter_avg/njitter, jitter_max);
        fprintf(stdout, "\n");
    }
    if (clientserver && !trans && do_owd && nowd) {

```

```

strcpy(fmt, "nuttcp%s%s: ");
if (format & PARSE)
    strcat(fmt, P_OWD_FMT);
else
    strcat(fmt, OWD_FMT);
fprintf(stdout, fmt, trans?"-t":"-r", ident,
    owd_min, owd_avg/nowd, owd_max);
fprintf(stdout, "\n");
}
if (verbose) {
strcpy(fmt, "nuttcp%s%s: ");
if (format & PARSE)
    strcat(fmt, "megabytes=%.4f cpu_seconds=%.2f KB_per_cpu_second=%.2f\n");
else
    strcat(fmt, "%.4f MB in %.2f CPU seconds = %.2f KB/cpu sec\n");
fprintf(stdout, fmt,
    trans?"-t":"-r", ident,
    (double)nbytes/(1024*1024), cput,
    (double)nbytes/cput/1024);
}
if (!udp && trans && (retransinfo > 0)) {
fprintf(stdout, "nuttcp%s%s: ",
    trans ? "-t" : "-r", ident);
if (format & PARSE)
    strcpy(fmt, P_RETRANS_FMT);
else
    strcpy(fmt, RETRANS_FMT);
fprintf(stdout, fmt,
    retransinfo == 1 ? "" : "host-", total_retrans);
if ((nstream > 1) && (retransinfo == 1) &&
    total_retrans) {
if (format & PARSE)
    fprintf(stdout, P_RETRANS_FMT_STREAMS,
        nretrans[1]);
else
    fprintf(stdout, " ( %d", nretrans[1]);
for ( stream_idx = 2; stream_idx <= nstream;
    stream_idx++ ) {
    fprintf(stdout, "+%d",
        nretrans[stream_idx]);
    }
if (!(format & PARSE))
    fprintf(stdout, " )");
}
fprintf(stdout, "\n");
}
}

strcpy(fmt, "nuttcp%s%s: ");

```



```

if (format & PARSE)
    strcat(fmt, "io_calls=%d msec_per_call=%.2f calls_per_sec=%.2f\n");
else
    strcat(fmt, "%d I/O calls, msec/call = %.2f, calls/sec = %.2f\n");
fprintf(stdout, fmt,
    trans?"-t":"-r", ident,
    numCalls,
    1024.0 * realt/((double)numCalls),
    ((double)numCalls)/realt);

strcpy(fmt, "nuttcp%s%s: ");
if (format & PARSE)
    strcat(fmt, "stats=cpu %s\n");
else
    strcat(fmt, "%s\n");
fprintf(stdout, fmt, trans?"-t":"-r", ident, stats);
}

if (format & PARSE)
    strcpy(fmt, P_CPU_STATS_FMT_IN2);
else
    strcpy(fmt, CPU_STATS_FMT_IN2);
if (sscanf(stats, fmt, &cpu_util) != 6) {
    if (format & PARSE)
        strcpy(fmt, P_CPU_STATS_FMT_IN);
    else
        strcpy(fmt, CPU_STATS_FMT_IN);
    sscanf(stats, fmt, &cpu_util);
}

if (brief && clientserver && client) {
    if ((brief < 0) || interval)
        fprintf(stdout, "\n");
    if (udp) {
        if (trans) {
            if (*ident)
                fprintf(stdout, "%s: ", ident + 1);
            if (format & PARSE)
                strcpy(fmt, P_PERF_FMT_BRIEF);
            else
                strcpy(fmt, PERF_FMT_BRIEF);
            fprintf(stdout, fmt,
                svr_MB, svr_realt, svr_Mbps,
                cpu_util, svr_cpu_util);
            if (!(format & NODROPS)) {
                if (format & PARSE)
                    strcpy(fmt, P_DROP_FMT_BRIEF);
                else

```

```

        strcpy(fmt, DROP_FMT_BRIEF);
    fprintf(stdout, fmt,
        (int64_t)((MB - svr_MB)
            *1024*1024)
            /buflen + 0.5),
        (uint64_t)((MB*1024*1024)
            /buflen + 0.5));
}
if (!(format & NOPERCENTLOSS)) {
    fractloss = ((MB != 0.0) ?
        1 - svr_MB/MB : 0.0);
    if (format & PARSE)
        strcpy(fmt, P_LOSS_FMT_BRIEF);
    else if ((fractloss != 0.0) &&
        (fractloss < 0.001))
        strcpy(fmt, LOSS_FMT_BRIEF5);
    else
        strcpy(fmt, LOSS_FMT_BRIEF);
    fprintf(stdout, fmt, fractloss * 100);
}
if (format & XMITSTATS) {
    if (format & PARSE)
        strcpy(fmt, P_PERF_FMT_BRIEF3);
    else
        strcpy(fmt, PERF_FMT_BRIEF3);
    fprintf(stdout, fmt, MB);
}
if ((do_jitter & JITTER_MIN) && njitter) {
    if (format & PARSE)
        strcpy(fmt,
            P_JITTER_MIN_FMT_BRIEF);
    else
        strcpy(fmt,
            JITTER_MIN_FMT_BRIEF);
    fprintf(stdout, fmt, jitter_min);
}
if ((do_jitter & JITTER_AVG) && njitter) {
    if (format & PARSE)
        strcpy(fmt,
            P_JITTER_AVG_FMT_BRIEF);
    else
        strcpy(fmt,
            JITTER_AVG_FMT_BRIEF);
    fprintf(stdout, fmt,
        jitter_avg/njitter);
}
if ((do_jitter & JITTER_MAX) && njitter) {
    if (format & PARSE)

```

```

        strcpy(fmt,
            P_JITTER_MAX_FMT_BRIEF);
    else
        strcpy(fmt,
            JITTER_MAX_FMT_BRIEF);
    fprintf(stdout, fmt, jitter_max);
}
if ((do_owd & OWD_MIN) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_MIN_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MIN_FMT_BRIEF);
    fprintf(stdout, fmt, owd_min);
}
if ((do_owd & OWD_AVG) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_AVG_FMT_BRIEF);
    else
        strcpy(fmt, OWD_AVG_FMT_BRIEF);
    fprintf(stdout, fmt, owd_avg/nowd);
}
if ((do_owd & OWD_MAX) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_MAX_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MAX_FMT_BRIEF);
    fprintf(stdout, fmt, owd_max);
}
}
else {
    if (*ident)
        fprintf(stdout, "%s: ", ident + 1);
    if (format & PARSE)
        strcpy(fmt, P_PERF_FMT_BRIEF);
    else
        strcpy(fmt, PERF_FMT_BRIEF);
    fprintf(stdout, fmt,
        MB, realt, (double)nbytes/realt/125000,
        svr_cpu_util, cpu_util);
    if (!(format & NODROPS)) {
        if (format & PARSE)
            strcpy(fmt, P_DROP_FMT_BRIEF);
        else
            strcpy(fmt, DROP_FMT_BRIEF);
        fprintf(stdout, fmt,

```

```

        (int64_t)(((srvr_MB - MB)
        * 1024 * 1024)
        / buflen + 0.5),
        (uint64_t)((srvr_MB * 1024 * 1024)
        / buflen + 0.5));
    }
    if (!(format & NOPERCENTLOSS)) {
        fractloss = ((srvr_MB != 0.0) ?
        1 - MB/srvr_MB : 0.0);
        if (format & PARSE)
            strcpy(fmt, P_LOSS_FMT_BRIEF);
        else if ((fractloss != 0.0) &&
        (fractloss < 0.001))
            strcpy(fmt, LOSS_FMT_BRIEF5);
        else
            strcpy(fmt, LOSS_FMT_BRIEF);
        fprintf(stdout, fmt, fractloss * 100);
    }
    if (format & XMITSTATS) {
        if (format & PARSE)
            strcpy(fmt, P_PERF_FMT_BRIEF3);
        else
            strcpy(fmt, PERF_FMT_BRIEF3);
        fprintf(stdout, fmt, srvr_MB);
    }
    if ((do_jitter & JITTER_MIN) && njitter) {
        if (format & PARSE)
            strcpy(fmt,
            P_JITTER_MIN_FMT_BRIEF);
        else
            strcpy(fmt,
            JITTER_MIN_FMT_BRIEF);
        fprintf(stdout, fmt, jitter_min);
    }
    if ((do_jitter & JITTER_AVG) && njitter) {
        if (format & PARSE)
            strcpy(fmt,
            P_JITTER_AVG_FMT_BRIEF);
        else
            strcpy(fmt,
            JITTER_AVG_FMT_BRIEF);
        fprintf(stdout, fmt,
        jitter_avg/njitter);
    }
    if ((do_jitter & JITTER_MAX) && njitter) {
        if (format & PARSE)
            strcpy(fmt,
            P_JITTER_MAX_FMT_BRIEF);
    }

```

```

else
    strcpy(fmt,
           JITTER_MAX_FMT_BRIEF);
fprintf(stdout, fmt, jitter_max);
}
if ((do_owd & OWD_MIN) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
               P_OWD_MIN_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MIN_FMT_BRIEF);
    fprintf(stdout, fmt, owd_min);
}
if ((do_owd & OWD_AVG) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
               P_OWD_AVG_FMT_BRIEF);
    else
        strcpy(fmt, OWD_AVG_FMT_BRIEF);
    fprintf(stdout, fmt, owd_avg/nowd);
}
if ((do_owd & OWD_MAX) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
               P_OWD_MAX_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MAX_FMT_BRIEF);
    fprintf(stdout, fmt, owd_max);
}
}
fprintf(stdout, "\n");
}
else
    if (trans) {
        if ((retransinfo > 0) &&
            (!(format & NORETRANS))) {
            if (format & DEBUGRETRANS) {
                sretrans = get_retrans(-1);
                fprintf(stdout,
                       "report system retrans = %d\n",
                       sretrans);
            }
        }
    }
    if (*ident)
        fprintf(stdout, "%s: ", ident + 1);
    if (format & PARSE)
        strcpy(fmt, P_PERF_FMT_BRIEF);
    else

```

```

strcpy(fmt, PERF_FMT_BRIEF);
fprintf(stdout, fmt,
        svr_MB, svr_realt, svr_Mbps,
        cpu_util, svr_cpu_util);
if ((nstream > 1) && (retransinfo == 1) &&
    total_retrans && !(format & NORETRANS) &&
    (brief & BRIEF_RETRANS_STREAMS)) {
    if (format & PARSE) {
        fprintf(stdout, P_RETRANS_FMT_BRIEF,
                "", total_retrans);
        fprintf(stdout,
                P_RETRANS_FMT_STREAMS,
                nretrans[1]);
    }
    else {
        fprintf(stdout,
                RETRANS_FMT_BRIEF_STR1,
                total_retrans,
                nretrans[1]);
    }
    for ( stream_idx = 2;
          stream_idx <= nstream;
          stream_idx++ ) {
        fprintf(stdout, "+%d",
                nretrans[stream_idx]);
    }
    if (!(format & PARSE))
        fprintf(stdout,
                RETRANS_FMT_BRIEF_STR2);
}
else if ((retransinfo > 0) &&
        (!(format & NORETRANS))) {
    if (format & PARSE)
        fprintf(stdout,
                P_RETRANS_FMT_BRIEF,
                retransinfo == 1 ?
                "" : "host-",
                total_retrans);
    else
        fprintf(stdout,
                RETRANS_FMT_BRIEF,
                total_retrans,
                retransinfo == 1 ?
                "" : "host-");
}
if (rtt && (format & WANTRTT)) {
    if (format & PARSE)
        strcpy(fmt, P_RTT_FMT_BRIEF);
}

```

```

else
    strcpy(fmt, RTT_FMT_BRIEF);
fprintf(stdout, fmt, rtt);
}
if ((do_owd & OWD_MIN) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_MIN_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MIN_FMT_BRIEF);
    fprintf(stdout, fmt, owd_min);
}
if ((do_owd & OWD_AVG) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_AVG_FMT_BRIEF);
    else
        strcpy(fmt, OWD_AVG_FMT_BRIEF);
    fprintf(stdout, fmt, owd_avg/nowd);
}
if ((do_owd & OWD_MAX) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_MAX_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MAX_FMT_BRIEF);
    fprintf(stdout, fmt, owd_max);
}
fprintf(stdout, "\n");
}
else {
    if (*ident)
        fprintf(stdout, "%s: ", ident + 1);
    if (format & PARSE)
        strcpy(fmt, P_PERF_FMT_BRIEF);
    else
        strcpy(fmt, PERF_FMT_BRIEF);
    fprintf(stdout, fmt,
        MB, reall, (double)nbytes/reall/125000,
        svr_cpu_util, cpu_util);
    if ((nstream > 1) && (retransinfo == 1) &&
        total_retrans && !(format & NORETRANS) &&
        (brief & BRIEF_RETRANS_STREAMS) &&
        (irvers >= 70101)) {
        if (format & PARSE) {
            fprintf(stdout, P_RETRANS_FMT_BRIEF,
                "", total_retrans);
            fprintf(stdout,

```

```

        P_RETRANS_FMT_STREAMS,
        nretrans[1]);
    }
else {
    fprintf(stdout,
        RETRANS_FMT_BRIEF_STR1,
        total_retrans,
        nretrans[1]);
    }
for ( stream_idx = 2;
    stream_idx <= nstream;
    stream_idx++ ) {
    fprintf(stdout, "+%d",
        nretrans[stream_idx]);
    }
if (!(format & PARSE))
    fprintf(stdout,
        RETRANS_FMT_BRIEF_STR2);
}
else if ((retransinfo > 0) &&
    (!(format & NORETRANS))) {
    if (format & PARSE)
        fprintf(stdout,
            P_RETRANS_FMT_BRIEF,
            retransinfo == 1 ?
                "" : "host-",
            total_retrans);
    else
        fprintf(stdout,
            RETRANS_FMT_BRIEF,
            total_retrans,
            retransinfo == 1 ?
                "" : "host-");
    }
if (rtt && (format & WANTRTT)) {
    if (format & PARSE)
        strcpy(fmt, P_RTT_FMT_BRIEF);
    else
        strcpy(fmt, RTT_FMT_BRIEF);
    fprintf(stdout, fmt, rtt);
    }
if ((do_owd & OWD_MIN) && nowd) {
    if (format & PARSE)
        strcpy(fmt,
            P_OWD_MIN_FMT_BRIEF);
    else
        strcpy(fmt, OWD_MIN_FMT_BRIEF);
    fprintf(stdout, fmt, owd_min);
}

```



```

    }
    if ((do_owd & OWD_AVG) && nowd) {
        if (format & PARSE)
            strcpy(fmt,
                P_OWD_AVG_FMT_BRIEF);
        else
            strcpy(fmt, OWD_AVG_FMT_BRIEF);
        fprintf(stdout, fmt, owd_avg/nowd);
    }
    if ((do_owd & OWD_MAX) && nowd) {
        if (format & PARSE)
            strcpy(fmt,
                P_OWD_MAX_FMT_BRIEF);
        else
            strcpy(fmt, OWD_MAX_FMT_BRIEF);
        fprintf(stdout, fmt, owd_max);
    }
    fprintf(stdout, "\n");
}
}
else {
    if (brief && !clientserver) {
        if (brief < 0)
            fprintf(stdout, "\n");
        if (*ident)
            fprintf(stdout, "%s: ", ident + 1);
        fprintf(stdout, PERF_FMT_BRIEF2 "\n", MB,
            realt, (double)nbytes/realt/125000, cpu_util,
            trans?"TX":"RX");
    }
}

cleanup:
if (clientserver) {
    if (client) {
        itimer.it_value.tv_sec = SRVR_INFO_TIMEOUT;
        itimer.it_value.tv_usec = 0;
        setitimer(ITIMER_REAL, &itimer, 0);
        if (brief <= 0)
            fputs("\n", stdout);
        if (brief <= 0) {
            if (got_srvr_output) {
                fputs(srvrbuf, stdout);
            }
        }
    }
    else {
        while (fgets(buf, mallocsize, stdin)) {
            setitimer(ITIMER_REAL, &itimer, 0);

```

```

        fputs(buf, stdout);
    }
}
itimer.it_value.tv_sec = 0;
itimer.it_value.tv_usec = 0;
setitimer(ITIMER_REAL, &itimer, 0);
fflush(stdout);
close(0);
}
else {
    fflush(stdout);
    close(1);
    if (!inetd) {
        dup(savestdout);
        close(savestdout);
        fflush(stderr);
        if (!nofork) {
            close(2);
            dup(1);
        }
    }
}
fclose(ctlconn);
if (!inetd)
    close(fd[0]);
if (!udp && trans && (retransinfo > 0)) {
    if (format & DEBUGRETRANS) {
        sretrans = get_retrans(-1);
        fprintf(stdout, "final system retrans = %d\n",
            sretrans);
    }
}
}
if (clientserver && !client) {
    for ( stream_idx = 1; stream_idx <= nstream; stream_idx++ ) {
        fd[stream_idx] = -1;
    }
    if (multilink &&
        ((trans && !reverse) || (!trans && reverse)) && !udp) {
        for ( stream_idx = 2; stream_idx <= nstream;
            stream_idx++ ) {
            res[stream_idx] = NULL;
        }
    }
}
itimer.it_value.tv_sec = 0;
itimer.it_value.tv_usec = 0;
itimer.it_interval.tv_sec = 0;
itimer.it_interval.tv_usec = 0;

```

```

setitimer(ITIMER_REAL, &itimer, 0);
signal(SIGALRM, SIG_DFL);
bzero((char *)&frominet, sizeof(frominet));
bzero((char *)&clientaddr, sizeof(clientaddr));
#ifdef AF_INET6
    bzero((char *)&clientaddr6, sizeof(clientaddr6));
    clientscope6 = 0;
#endif
cput = 0.000001;
realt = 0.000001;
nbytes = 0;
ntbytes = 0;
ntbytesc = 0;
chk_nbytes = 0;
numCalls = 0;
/* Don't re-initialize buflen since it's used to */
/* determine if we need to change the buffer memory */
/* allocation for the next client data stream request */
/* buflen = 64 * 1024; */
/* if (udp) buflen = DEFAULTUDPBUFLen; */
nbuf = 0;
sendwin = origsendwin;
rcvwin = origrcvwin;
b_flag = 1;
rate = MAXRATE;
maxburst = 1;
nburst = 1;
irate = 0;
irate_cum_nsec = 0.0;
timeout = 0.0;
interval = 0.0;
chk_interval = 0.0;
chk_idle_data = 0.0;
datamss = 0;
tos = 0;
nodelay = 0;
do_poll = 0;
pbytes = 0;
ptbytes = 0;
ident[0] = '\0';
intr = 0;
abortconn = 0;
ipad_stride.ip32 = 0;
port = 5101;
srcport = 0;
trans = 0;
braindead = 0;
udp = 0;

```

```

udplossinfo = 0;
do_jitter = 0;
do_owd = 0;
retransinfo = 0;
force_retrans = 0;
rtt = 0.0;
pretrans = 0;
sretrans = 0;
got_srvr_output = 0;
reading_srvr_info = 0;
reverse = 0;
format = 0;
traceroute = 0;
multicast = 0;
mc_addr = NULL;
ssm = -1;
skip_data = 0;
host3 = NULL;
thirdparty = 0;
ctlport3 = 0;
nbuf_bytes = 0;
rate_pps = 0;
brief = 0;
done = 0;
got_begin = 0;
two_bod = 0;
handle_urg = 0;
for ( stream_idx = 0; stream_idx <= nstream; stream_idx++ ) {
    if (res[stream_idx]) {
        freeaddrinfo(res[stream_idx]);
        res[stream_idx] = NULL;
    }
    nretrans[stream_idx] = 0;
    iretrans[stream_idx] = 0;
}
nstream = 1;
multilink = 0;
if (!oneshot)
    goto doit;
exit(0);
}

if (multilink) {
    for ( stream_idx = 2; stream_idx <= nstream; stream_idx++ ) {
        res[stream_idx] = NULL;
    }
}
for ( stream_idx = 0; stream_idx <= nstream; stream_idx++ ) {

```

```

    if (res[stream_idx]) {
        freeaddrinfo(res[stream_idx]);
        res[stream_idx] = NULL;
    }
}

exit(0);

usage:
    fprintf(stdout, Usage);
    exit(1);
}

static void
err( char *s )
{
    long flags, saveflags;

    fprintf(stderr, "nuttcp%s%s: v%d.%d.%d%s: Error: ", trans?"-t":"-r",
        ident, vers_major, vers_minor, vers_delta,
        beta ? BETA_STR : "");
    perror(s);
    fprintf(stderr, "errno=%d\n", errno);
    fflush(stderr);
    if ((stream_idx > 0) && !done &&
        clientserver && !client && !trans && handle_urg) {
        /* send 'A' for ABORT as urgent TCP data
         * on control connection (don't block) */
        saveflags = fcntl(fd[0], F_GETFL, 0);
        if (saveflags != -1) {
            flags = saveflags | O_NONBLOCK;
            fcntl(fd[0], F_SETFL, flags);
        }
        send(fd[0], "A", 1, MSG_OOB);
        if (saveflags != -1) {
            flags = saveflags;
            fcntl(fd[0], F_SETFL, flags);
        }
    }
    exit(1);
}

static void
mes( char *s )
{
    fprintf(stdout, "nuttcp%s%s: v%d.%d.%d%s: %s\n", trans?"-t":"-r", ident,
        vers_major, vers_minor, vers_delta,
        beta ? BETA_STR : "", s);
}

```

```

}

static void
errmes( char *s )
{
    fprintf(stderr, "nuttcp%s%s: v%d.d.%d.%d%s: Error: ", trans?"-t":"-r",
            ident, vers_major, vers_minor, vers_delta,
            beta ? BETA_STR : "");
    perror(s);
    fprintf(stderr, "errno=%d\n", errno);
    fflush(stderr);
}

```

```

void
pattern( register char *cp, register int cnt )
{
    register char c;
    c = 0;
    while (cnt-- > 0) {
        while (!isprint((c&0x7F))) c++;
        *cp++ = (c++&0x7F);
    }
}

```

```

/*
 *   P R E P _ T I M E R
 */
void
prep_timer()
{
    gettimeofday(&time0, (struct timezone *)0);
    timep.tv_sec = time0.tv_sec;
    timep.tv_usec = time0.tv_usec;
    timepk.tv_sec = time0.tv_sec;
    timepk.tv_usec = time0.tv_usec;
    getrusage(RUSAGE_SELF, &ru0);
}

```

```

/*
 *   R E A D _ T I M E R
 *
 */
double
read_timer( char *str, int len )
{
    struct timeval timedol;
    struct rusage ru1;
    struct timeval td;

```

```

struct timeval tend, tstart;
char line[132];

getrusage(RUSAGE_SELF, &ru1);
gettimeofday(&timedol, (struct timezone *)0);
prusage(&ru0, &ru1, &timedol, &time0, line);
(void)strncpy( str, line, len );

/* Get real time */
tvsub( &td, &timedol, &time0 );
real = td.tv_sec + ((double)td.tv_usec) / 1000000;

/* Get CPU time (user+sys) */
tvadd( &tend, &ru1.ru_utime, &ru1.ru_stime );
tvadd( &tstart, &ru0.ru_utime, &ru0.ru_stime );
tvsub( &td, &tend, &tstart );
cput = td.tv_sec + ((double)td.tv_usec) / 1000000;
if (cput < 0.00001) cput = 0.00001;
return( cput );
}

static void
prusage( register struct rusage *r0, register struct rusage *r1, struct timeval *e, struct timeval *b, char *outp )
{
    struct timeval tdiff;
    register time_t t;
    register char *cp;
    register int i;
    int ms;

    t = (r1->ru_utime.tv_sec-r0->ru_utime.tv_sec)*100+
        (r1->ru_utime.tv_usec-r0->ru_utime.tv_usec)/10000+
        (r1->ru_stime.tv_sec-r0->ru_stime.tv_sec)*100+
        (r1->ru_stime.tv_usec-r0->ru_stime.tv_usec)/10000;
    ms = (e->tv_sec-b->tv_sec)*100 + (e->tv_usec-b->tv_usec)/10000;

#define END(x) { while (*x) x++; }

    if (format & PARSE)
        cp = "user=%U system=%S elapsed=%E cpu=%P memory=%Xi+%Dd-%Mmaxrss io=%F+%Rpf
swaps=%Ccsw";
    else
        cp = "%User %Ssys %Ereal %P %Xi+%Dd %Mmaxrss %F+%Rpf %Ccsw";

    for ( ; *cp; cp++ ) {
        if (*cp != '%')
            *outp++ = *cp;
        else if (cp[1]) switch(*++cp) {

```

```

case 'U':
    tvsub(&tdiff, &r1->ru_utime, &r0->ru_utime);
    sprintf(outp, "%ld.%01ld", (long)tdiff.tv_sec, (long)tdiff.tv_usec/100000);
    END(outp);
    break;

case 'S':
    tvsub(&tdiff, &r1->ru_stime, &r0->ru_stime);
    sprintf(outp, "%ld.%01ld", (long)tdiff.tv_sec, (long)tdiff.tv_usec/100000);
    END(outp);
    break;

case 'E':
    psecs(ms / 100, outp);
    END(outp);
    break;

case 'P':
    sprintf(outp, "%d%%", (int) (t*100 / ((ms ? ms : 1))));
    END(outp);
    break;

case 'W':
    i = r1->ru_nswap - r0->ru_nswap;
    sprintf(outp, "%d", i);
    END(outp);
    break;

case 'X':
    sprintf(outp, "%ld", t == 0 ? 0 : (r1->ru_ixrss-r0->ru_ixrss)/t);
    END(outp);
    break;

case 'D':
    sprintf(outp, "%ld", t == 0 ? 0 :
        (r1->ru_idrss+r1->ru_isrss-(r0->ru_idrss+r0->ru_isrss))/t);
    END(outp);
    break;

case 'K':
    sprintf(outp, "%ld", t == 0 ? 0 :
        ((r1->ru_ixrss+r1->ru_isrss+r1->ru_idrss) -
        (r0->ru_ixrss+r0->ru_idrss+r0->ru_isrss))/t);
    END(outp);
    break;

case 'M':

```



```

        sprintf(outp, "%ld", r1->ru_maxrss/2);
        END(outp);
        break;

    case 'F':
        sprintf(outp, "%ld", r1->ru_majflt-r0->ru_majflt);
        END(outp);
        break;

    case 'R':
        sprintf(outp, "%ld", r1->ru_minflt-r0->ru_minflt);
        END(outp);
        break;

    case 'I':
        sprintf(outp, "%ld", r1->ru_inblock-r0->ru_inblock);
        END(outp);
        break;

    case 'O':
        sprintf(outp, "%ld", r1->ru_oublock-r0->ru_oublock);
        END(outp);
        break;

    case 'C':
        sprintf(outp, "%ld+%ld", r1->ru_nvcsw-r0->ru_nvcsw,
            r1->ru_nivcsw-r0->ru_nivcsw);
        END(outp);
        break;
    }
}
*outp = '\0';
}

static void
tvadd( struct timeval *tsum, struct timeval *t0, struct timeval *t1 )
{

    tsum->tv_sec = t0->tv_sec + t1->tv_sec;
    tsum->tv_usec = t0->tv_usec + t1->tv_usec;
    if (tsum->tv_usec > 1000000)
        tsum->tv_sec++, tsum->tv_usec -= 1000000;
}

static void
tvsub( struct timeval *tdiff, struct timeval *t1, struct timeval *t0 )
{

    tdiff->tv_sec = t1->tv_sec - t0->tv_sec;

```

```

tdiff->tv_usec = t1->tv_usec - t0->tv_usec;
if (tdiff->tv_usec < 0)
    tdiff->tv_sec--, tdiff->tv_usec += 1000000;
}

static void
psecs( long l, register char *cp )
{
    register int i;

    i = l / 3600;
    if (i) {
        sprintf(cp, "%d:", i);
        END(cp);
        i = l % 3600;
        sprintf(cp, "%d%d", (i/60) / 10, (i/60) % 10);
        END(cp);
    } else {
        i = l;
        sprintf(cp, "%d", i / 60);
        END(cp);
    }
    i %= 60;
    *cp++ = ':';
    sprintf(cp, "%d%d", i / 10, i % 10);
}

/*
 *   N R E A D
 */
int
Nread( int fd, char *buf, int count )
{
    struct sockaddr_storage from;
    socklen_t len = sizeof(from);
    struct timeval timed; /* time delta */
    register int cnt;
    if (udp) {
        cnt = recvfrom( fd, buf, count, 0, (struct sockaddr *)&from, &len );
        numCalls++;
    } else {
        if (b_flag)
            cnt = mread( fd, buf, count ); /* fill buf */
        else {
            cnt = read( fd, buf, count );
            numCalls++;
        }
    }
}

```

```

if (do_owd && (cnt > 4)) {
    uint32_t secs, usecs;

    /* get transmitter timestamp */
    bcopy(buf + 8, &secs, 4);
    bcopy(buf + 12, &usecs, 4);
    timetx.tv_sec = ntohl(secs);
    timetx.tv_usec = ntohl(usecs);
    gettimeofday(&timerx, (struct timezone *)0);
    tvsub( &timed, &timerx, &timetx );
    owd = timed.tv_sec*1000 + ((double)timed.tv_usec)/1000;
    nowd++;
    if (owd < owd_min)
        owd_min = owd;
    if (owd > owd_max)
        owd_max = owd;
    owd_avg += owd;
    nowdi++;
    if (owd < owd_mini)
        owd_mini = owd;
    if (owd > owd_maxi)
        owd_maxi = owd;
    owd_avgi += owd;
}
return(cnt);
}

/*
 *   N W R I T E
 */
int
Nwrite( int fd, char *buf, int count )
{
    struct timeval timedol;
    struct timeval td;
    register int cnt = 0;
    double deltat;

    if (irate) {
        /* Get real time */
        gettimeofday(&timedol, (struct timezone *)0);
        tvsub( &td, &timedol, &timepk );
        deltat = td.tv_sec + ((double)td.tv_usec) / 1000000;

        if (deltat >= (1 + maxburst)*pkt_time) {
            timepk.tv_sec = timedol.tv_sec;
            timepk.tv_usec = timedol.tv_usec;
            irate_cum_nsec = 0;
        }
    }
}

```

```

    deltat = 0.0;
    nburst = 1;
}

if (nburst++ >= maxburst) {
    while ((maxburst*(double)count/rate/125 > deltat)
        && !intr) {
        /* Get real time */
        gettimeofday(&timedol, (struct timezone *)0);
        tvsub( &td, &timedol, &timepk );
        deltat = td.tv_sec + ((double)td.tv_usec)
            / 1000000;
    }
}

if (nburst > maxburst) {
    irate_cum_nsec += maxburst*irate_pk_nsec;
    while (irate_cum_nsec >= 1000.0) {
        irate_cum_nsec -= 1000.0;
        timepk.tv_usec++;
    }
    timepk.tv_usec += maxburst*irate_pk_usec;
    while (timepk.tv_usec >= 1000000) {
        timepk.tv_usec -= 1000000;
        timepk.tv_sec++;
    }
    nburst = 1;
}
if (intr && (!udp || (count != 4))) return(0);
}
else {
    while ((double)nbytes/realt/125 > rate) {
        /* Get real time */
        gettimeofday(&timedol, (struct timezone *)0);
        tvsub( &td, &timedol, &time0 );
        reall = td.tv_sec + ((double)td.tv_usec) / 1000000;
        if (reall <= 0.0) reall = 0.000001;
    }
}
if (do_owd && (count > 4)) {
    uint32_t secs, usecs;

    /* record transmitter timestamp in packet */
    gettimeofday(&timedol, (struct timezone *)0);
    secs = htonl(timedol.tv_sec);
    usecs = htonl(timedol.tv_usec);
    bcopy(&secs, buf + 8, 4);
    bcopy(&usecs, buf + 12, 4);
}

```

```

    }
    if (udp) {
again:
    if (af == AF_INET) {
        cnt = sendto( fd, buf, count, 0, (struct sockaddr *)&sinhim[stream_idx + 1], sizeof(sinhim[stream_idx + 1]) );
    }
#ifdef AF_INET6
    else if (af == AF_INET6) {
        cnt = sendto( fd, buf, count, 0, (struct sockaddr *)&sinhim6[stream_idx + 1], sizeof(sinhim6[stream_idx + 1])
);
    }
#endif
    else {
        err("unsupported AF");
    }
    numCalls++;
    if (cnt < 0 && errno == ENOBUFS) {
        delay(18000);
        errno = 0;
        goto again;
    }
} else {
    cnt = write( fd, buf, count );
    numCalls++;
}
return(cnt);
}

int
delay( int us )
{
    struct timeval tv;

    tv.tv_sec = 0;
    tv.tv_usec = us;
    (void)select( 1, (fd_set *)0, (fd_set *)0, (fd_set *)0, &tv );
    return(1);
}

/*
 *   M R E A D
 *
 * This function performs the function of a read(II) but will
 * call read(II) multiple times in order to get the requested
 * number of characters. This can be necessary because
 * network connections don't deliver data with the same
 * grouping as it is written with. Written by Robert S. Miles, BRL.
 */

```

```

int
mread( int fd, register char *bufp, unsigned n )
{
    register unsigned    count = 0;
    register int        nread;

    do {
        nread = read(fd, bufp, n-count);
        numCalls++;
        if (nread < 0) {
            if (errno != EINTR)
                perror("nuttcp_mread");
            return(-1);
        }
        if (nread == 0)
            return((int)count);
        count += (unsigned)nread;
        bufp += nread;
    } while (count < n);

    return((int)count);
}

/*
 *   M W R I T E
 *
 * This function performs the function of a write(II) but will
 * call write(II) multiple times in order to put the requested
 * number of characters. This can be necessary because
 * piped connections may not be able to deliver data with
 * the full requested count.
 */
int
mwrite( int fd, register char *bufp, unsigned n, int last_write )
{
    register unsigned    count = 0;
    register int        nwrite;
#ifdef linux
    long                flags;

    if (directio && last_write) {
        flags = fcntl(savestdout, F_GETFL, 0);
        if (flags < 0)
            errmes("fcntl get O_DIRECT");
        else {
            flags &= ~O_DIRECT;
            if (fcntl(savestdout, F_SETFL, flags) < 0)
                errmes("fcntl set O_DIRECT");
        }
    }

```

```

    }
}
#endif
do {
    nwrite = write(fd, bufp, n-count);
    numCalls++;
    if (nwrite < 0) {
        if (errno != EINTR)
            perror("nuttcp_mwrite");
        return(-1);
    }
    count += (unsigned)nwrite;
    bufp += nwrite;
} while (count < n);

return((int)count);
}

/*
 *   G E T O P T V A L P
 *
 * This function returns a character pointer to the option value
 * pointed at by argv and sets skiparg to 1 if the option and its
 * value were passed as separate arguments (otherwise it sets
 * skiparg to 0).  index is the position within argv where the
 * option value resides if the option was specified as a single
 * argument.  reqval indicates whether or not the option requires
 * a value
 */
char *
getoptvalp( char **argv, int index, int reqval, int *skiparg )
{
    struct sockaddr_storage dummy;
    char **nextarg;

    *skiparg = 0;
    nextarg = argv + 1;

    /* if there is a value in the current arg return it */
    if (argv[0][index])
        return(&argv[0][index]);

    /* if there isn't a next arg return a pointer to the
       current arg value (which will be an empty string) */
    if (*nextarg == NULL)
        return(&argv[0][index]);

    /* if the next arg is another option, and a value isn't

```

```

* required, return a pointer to the current arg value
* (which will be an empty string) */
if (**nextarg == '-') && !reqval)
    return(&argv[0][index]);

/* if there is an arg after the next arg and it is another
option, return the next arg as the option value */
if (*(nextarg + 1) && (*(nextarg + 1) == '-')) {
    *skiparg = 1;
    return(*nextarg);
}

/* if the option requires a value, return the next arg
as the option value */
if (reqval) {
    *skiparg = 1;
    return(*nextarg);
}

/* if the next arg is an Ipv4 address, return a pointer to the
current arg value (which will be an empty string) */
if (inet_pton(AF_INET, *nextarg, &dummy) > 0)
    return(&argv[0][index]);

#ifdef AF_INET6
/* if the next arg is an Ipv6 address, return a pointer to the
current arg value (which will be an empty string) */
if (inet_pton(AF_INET6, *nextarg, &dummy) > 0)
    return(&argv[0][index]);
#endif

/* if the next arg begins with an alphabetic character,
assume it is a hostname and thus return a pointer to the
current arg value (which will be an empty string).
note all current options which don't require a value
have numeric values (start with a digit) */
if (isalpha((int)**nextarg))
    return(&argv[0][index]);

/* assume the next arg is the option value */
*skiparg = 1;

return(*nextarg);
}

#define PROC_SNMP    "/proc/net/snmp"
#define PROC_BUF_LEN    256
#define PROC_BUF_LEN2    128

```



```

#define NETSTAT      "netstat"

#if defined(linux)
#define RETRANS      "segments retransmited"
#define NETSTAT_DIR  "/bin/"
#define NRETRANS_BEFORE
#elif defined(__FreeBSD__)
#define RETRANS      "retransmitted"
#define NETSTAT_DIR  "/usr/bin/"
#define NRETRANS_BEFORE
#elif defined(__APPLE__) && defined(__MACH__)
#define RETRANS      "retransmitted"
#define NETSTAT_DIR  "/usr/sbin/"
#define NRETRANS_BEFORE
#elif defined(sparc)
#define RETRANS      "tcpRetransSegs"
#define NETSTAT_DIR  "/usr/bin/"
#elif defined(sgi)
#define RETRANS      "retransmitted"
#define NETSTAT_DIR  "/usr/etc/"
#define NRETRANS_BEFORE
#elif defined(__CYGWIN__) || defined(_WIN32)
#define RETRANS      "Segments Retransmitted"
#define NETSTAT_DIR  ""
#else
#define RETRANS      "retransmitted"
#define NETSTAT_DIR  "/usr/bin/"
#define NRETRANS_BEFORE
#endif

char  proc_buf[PROC_BUF_LEN];
char  proc_buf2[PROC_BUF_LEN2];

int get_retrans( int sockfd )
{
    FILE  *proc_snmp;
    char  *cp, *cp2;
    int num_retrans;
    int pipefd[2];
    int pidstat;
    pid_t  pid = 0;
    pid_t  wait_pid;

    if (retransinfo < 0)
        return(0);

#if defined(linux) && defined(TCPI_OPT_TIMESTAMPS)
    if ((retransinfo <= 1) && (sockfd >= 0)) {

```

```

optlen = sizeof(tcpinf);
if (getsockopt(sockfd, SOL_TCP, TCP_INFO, (void *)&tcpinf,
    &optlen) == 0) {
    if (optlen >= SIZEOF_TCP_INFO_RETRANS) {
        retransinfo = 1;
        b_flag = 1;
        return(tcpinf.tcpi_total_retrans);
    }
}
if (retransinfo == 1) {
    retransinfo = -1;
    return(0);
}
retransinfo = 2;
}
#endif

if ((retransinfo == 3) || (!(proc_snmp = fopen(PROC_SNMP, "r")))) {
    retransinfo = 3;
    if (pipe(pipefd) != 0) {
        retransinfo = -1;
        return(0);
    }
    if ((pid = fork()) == (pid_t)-1) {
        perror("can't fork");
        close(pipefd[0]);
        close(pipefd[1]);
        retransinfo = -1;
        return(0);
    }
    if (pid == 0) {
        signal(SIGINT, SIG_DFL);
        close(1);
        close(2);
        dup(pipefd[1]);
        dup(pipefd[1]);
        close(pipefd[0]);
        close(pipefd[1]);
        execl(NETSTAT_DIR NETSTAT, NETSTAT, "-s", NULL);
        perror("execl failed");
        fprintf(stderr, "failed to execute %s%s -s\n",
            NETSTAT_DIR, NETSTAT);
        fflush(stdout);
        fflush(stderr);
        exit(0);
    }
    close(pipefd[1]);
    if (!(proc_snmp = fdopen(pipefd[0], "r")) {

```

```

        close(pipefd[0]);
        retransinfo = -1;
        return(0);
    }
}

errno = 0;
num_retrans = -1;
while (fgets(proc_buf, sizeof(proc_buf), proc_snmp)) {
    if (retransinfo == 2) {
        if (strncmp(proc_buf, "Tcp:", 4) != 0)
            continue;
        if ((!fgets(proc_buf2, sizeof(proc_buf2), proc_snmp))
            || (strncmp(proc_buf2, "Tcp:", 4) != 0))
            break;
        cp = proc_buf;
        cp2 = proc_buf2;
        while ((cp = strchr(cp, ' '))) {
            while (*++cp == ' ')
                ;
            if (!(*cp))
                goto close;
            if (!cp2 = strchr(cp2, ' '))
                goto close;
            while (*++cp2 == ' ')
                ;
            if (!(*cp2))
                goto close;
            if (strncmp(cp, "RetransSegs", 11) == 0) {
                if (!isdigit((int)(*cp2)))
                    goto close;
                num_retrans = atoi(cp2);
                goto close;
            }
        }
        else
            continue;
    }
}
else {
    if ((cp = strstr(proc_buf, RETRANS))) {
#ifdef NRETRANS_BEFORE
        num_retrans = atoi(proc_buf);
#else
        cp2 = strchr(cp, '=');
        cp2++;
        num_retrans = atoi(cp2);
#endif
    }
    break;
}

```

```

    }
  }
}

close:
fclose(proc_snmp);
if (retransinfo == 3) {
  while ((wait_pid = wait(&pidstat)) != pid) {
    if (wait_pid == (pid_t)-1) {
      if (errno == ECHILD)
        break;
      err("wait failed");
    }
  }
}

if (num_retrans < 0) {
  retransinfo = -1;
  return(0);
}

return(num_retrans);
}

#ifdef linux && defined(TCPI_OPT_TIMESTAMPS)

void
print_tcpinfo()
{
  fprintf(stdout, "state = %d, ca_state = %d, retransmits = %d, "
    "unacked = %d, sacked = %d\n",
    tcpinf.tcpinfo_state, tcpinf.tcpinfo_ca_state,
    tcpinf.tcpinfo_retransmits, tcpinf.tcpinfo_unacked,
    tcpinf.tcpinfo_sacked);
  fprintf(stdout, "    lost = %d, retrans = %d, fackets = %d, "
    "rtt = %d, rttvar = %d\n",
    tcpinf.tcpinfo_lost, tcpinf.tcpinfo_retrans,
    tcpinf.tcpinfo_fackets, tcpinf.tcpinfo_rtt,
    tcpinf.tcpinfo_rttvar);
  fprintf(stdout, "    snd_ssthresh = %d, snd_cwnd = %d, "
    "total_retrans = %d\n",
    tcpinf.tcpinfo_snd_ssthresh, tcpinf.tcpinfo_snd_cwnd,
    tcpinf.tcpi_total_retrans);
  return;
}

#endif

```

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features:

- Support for activation of iLO Advanced license as a manual cleaning step in iLO drivers.

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[ bug 1535878 <<https://bugs.launchpad.net/keystone/+bug/1535878>>`\_] Originally, to perform GET /projects/{project\_id}, the provided policy files required a user to have at least project admin level of permission. They have been updated to allow it to be performed by any user who has a role on the project.

## 1.37 OpenStack Keystone Python Client Newton

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### 1.0.3

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## 1.52 OpenStack Swift Python Client Newton

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## 1.54 python-attrdict 2.0.0

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# 1.60 python-engineio 1.2.3

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## 1.61 python-k8sclient 0.1.0

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## 1.62 python-networking-cisco 4.0.0

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## 1.64 python-oslo-middleware 3.0.0

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## 1.72 qemu 2.3.0

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Index: debug.c

=====  
RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/debug.c,v

retrieving revision 1.1

retrieving revision 1.3

diff -u -u -r1.1 -r1.3

--- debug.c 7 Sep 2007 10:01:21 -0000 1.1

+++ debug.c 15 Jan 2008 13:49:25 -0000 1.3

@@ -52,7 +52,11 @@

void X86EMU\_trace\_regs (void)

{

    if (DEBUG\_TRACE()) {

-    x86emu\_dump\_regs();

+ if (M.x86.mode & (SYSMODE\_PREFIX\_DATA | SYSMODE\_PREFIX\_ADDR)) {

+    x86emu\_dump\_xregs();

+ } else {

+    x86emu\_dump\_regs();

+ }

    }

    if (DEBUG\_DECODE() && ! DEBUG\_DECODE\_NOPRINT()) {

        printk("%04x:%04x ", M.x86.saved\_cs, M.x86.saved\_ip);

@@ -185,7 +189,7 @@

        for (i=0; i< M.x86.enc\_pos; i++) {

            sprintf(buf1+2\*i, "%02x", fetch\_data\_byte\_abs(s,o+i));

        }

-    printk("%-20s", buf1);

+    printk("%-20s ", buf1);

    }

static void print\_decoded\_instruction (void)

Index: ops2.c

```

=====
RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/ops2.c,v
retrieving revision 1.1
retrieving revision 1.3
diff -u -u -r1.1 -r1.3
--- ops2.c 7 Sep 2007 10:01:21 -0000 1.1
+++ ops2.c 20 Mar 2008 15:48:34 -0000 1.3
@@ -149,8 +149,69 @@
     target += (s16) M.x86.R_IP;
     DECODE_PRINTF2("%04x\n", target);
     TRACE_AND_STEP();
-   if (cond)
+   if (cond) {
+       M.x86.R_IP = (u16)target;
+   JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, M.x86.R_CS, M.x86.R_IP, " LONG COND ");
+   }
+   DECODE_CLEAR_SEGOVR();
+   END_OF_INSTR();
+}
+
+/******
+REMARKS:
+Handles opcode 0x0f,0xC8-0xCF
+*****/
+s32 x86emu_bswap(s32 reg)
+{
+   // perform the byte swap
+   s32 temp = reg;
+   reg = (temp & 0xFF000000) >> 24;
+   reg |= (temp & 0xFF0000) >> 8;
+   reg |= (temp & 0xFF00) << 8;
+   reg |= (temp & 0xFF) << 24;
+   return reg;
+}
+
+void x86emuOp2_bswap(u8 op2)
+{
+   /* byte swap 32 bit register */
+   START_OF_INSTR();
+   DECODE_PRINTF("BSWAP\t");
+   switch (op2) {
+       case 0xc8:
+           DECODE_PRINTF("EAX\n");
+           M.x86.R_EAX = x86emu_bswap(M.x86.R_EAX);
+           break;
+       case 0xc9:
+           DECODE_PRINTF("ECX\n");
+           M.x86.R_ECX = x86emu_bswap(M.x86.R_ECX);

```

```

+   break;
+   case 0xca:
+       DECODE_PRINTF("EDX\n");
+       M.x86.R_EDX = x86emu_bswap(M.x86.R_EDX);
+       break;
+   case 0xcb:
+       DECODE_PRINTF("EBX\n");
+       M.x86.R_EBX = x86emu_bswap(M.x86.R_EBX);
+       break;
+   case 0xcc:
+       DECODE_PRINTF("ESP\n");
+       M.x86.R_ESP = x86emu_bswap(M.x86.R_ESP);
+       break;
+   case 0xcd:
+       DECODE_PRINTF("EBP\n");
+       M.x86.R_EBP = x86emu_bswap(M.x86.R_EBP);
+       break;
+   case 0xce:
+       DECODE_PRINTF("ESI\n");
+       M.x86.R_ESI = x86emu_bswap(M.x86.R_ESI);
+       break;
+   case 0xcf:
+       DECODE_PRINTF("EDI\n");
+       M.x86.R_EDI = x86emu_bswap(M.x86.R_EDI);
+       break;
+   }
+   TRACE_AND_STEP();
+   DECODE_CLEAR_SEGOVR();
+   END_OF_INSTR();
+ }
@@ -1702,14 +1763,14 @@
/* 0xc5 */ x86emuOp2_illegal_op,
/* 0xc6 */ x86emuOp2_illegal_op,
/* 0xc7 */ x86emuOp2_illegal_op,
/* 0xc8 */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xc9 */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xca */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xcb */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xcc */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xcd */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xce */ x86emuOp2_illegal_op, /* TODO: bswap */
/* 0xcf */ x86emuOp2_illegal_op, /* TODO: bswap */
+/* 0xc8 */ x86emuOp2_bswap,
+/* 0xc9 */ x86emuOp2_bswap,
+/* 0xca */ x86emuOp2_bswap,
+/* 0xcb */ x86emuOp2_bswap,
+/* 0xcc */ x86emuOp2_bswap,
+/* 0xcd */ x86emuOp2_bswap,

```

+/\* 0xce \*/ x86emuOp2\_bswap,

+/\* 0xcf \*/ x86emuOp2\_bswap,

/\* 0xd0 \*/ x86emuOp2\_illegal\_op,

/\* 0xd1 \*/ x86emuOp2\_illegal\_op,

Index: ops.c

=====  
RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/ops.c,v

retrieving revision 1.1

diff -u -u -r1.1 ops.c

--- ops.c 7 Sep 2007 10:01:21 -0000 1.1

+++ ops.c 20 Mar 2008 16:52:00 -0000

@@ -1061,7 +1061,11 @@

imm = (s8)fetch\_byte\_imm();

DECODE\_PRINTF2("PUSH\t%d\n", imm);

TRACE\_AND\_STEP();

- push\_word(imm);

+ if (M.x86.mode & SYSMODE\_PREFIX\_DATA) {

+ push\_long(imm);

+ } else {

+ push\_word(imm);

+ }

DECODE\_CLEAR\_SEGOVR();

END\_OF\_INSTR();

}

@@ -1256,8 +1260,10 @@

target = (u16)(M.x86.R\_IP + (s16)offset);

DECODE\_PRINTF2("%x\n", target);

TRACE\_AND\_STEP();

- if (cond)

+ if (cond) {

    M.x86.R\_IP = target;

+ JMP\_TRACE(M.x86.saved\_cs, M.x86.saved\_ip, M.x86.R\_CS, M.x86.R\_IP, " NEAR COND ");

+ }

DECODE\_CLEAR\_SEGOVR();

END\_OF\_INSTR();

}

@@ -2516,9 +2522,11 @@

count = 1;

if (M.x86.mode & (SYSMODE\_PREFIX\_REPE | SYSMODE\_PREFIX\_REPNE)) {

    /\* dont care whether REPE or REPNE \*/

- /\* move them until CX is ZERO. \*/

- count = M.x86.R\_CX;

+ /\* move them until (E)CX is ZERO. \*/

+ count = (M.x86.mode & SYSMODE\_32BIT\_REP) ? M.x86.R\_ECX : M.x86.R\_CX;

    M.x86.R\_CX = 0;

+ if (M.x86.mode & SYSMODE\_32BIT\_REP)

+     M.x86.R\_ECX = 0;

```

M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
}
while (count--) {
@@ -2526,6 +2534,8 @@
store_data_byte_abs(M.x86.R_ES, M.x86.R_DI, val);
M.x86.R_SI += inc;
M.x86.R_DI += inc;
+ if (M.x86.intr & INTR_HALTED)
+ break;
}
DECODE_CLEAR_SEGOVR();
END_OF_INSTR();
@@ -2559,9 +2569,11 @@
count = 1;
if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
/* dont care whether REPE or REPNE */
- /* move them until CX is ZERO. */
- count = M.x86.R_CX;
+ /* move them until (E)CX is ZERO. */
+ count = (M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX;
M.x86.R_CX = 0;
+ if (M.x86.mode & SYSMODE_32BIT_REP)
+ M.x86.R_ECX = 0;
M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
}
while (count--) {
@@ -2574,6 +2586,8 @@
}
M.x86.R_SI += inc;
M.x86.R_DI += inc;
+ if (M.x86.intr & INTR_HALTED)
+ break;
}
DECODE_CLEAR_SEGOVR();
END_OF_INSTR();
@@ -2598,16 +2612,21 @@

if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
/* REPE */
- /* move them until CX is ZERO. */
- while (M.x86.R_CX != 0) {
+ /* move them until (E)CX is ZERO. */
+ while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
val1 = fetch_data_byte(M.x86.R_SI);
val2 = fetch_data_byte_abs(M.x86.R_ES, M.x86.R_DI);
cmp_byte(val1, val2);
- M.x86.R_CX -= 1;
+ if (M.x86.mode & SYSMODE_32BIT_REP)

```

```

+     M.x86.R_ECX -= 1;
+     else
+     M.x86.R_CX -= 1;
+     M.x86.R_SI += inc;
+     M.x86.R_DI += inc;
+     if ( (M.x86.mode & SYSMODE_PREFIX_REPE) && (ACCESS_FLAG(F_ZF) == 0) ) break;
+     if ( (M.x86.mode & SYSMODE_PREFIX_REPNE) && ACCESS_FLAG(F_ZF) ) break;
+     if (M.x86.intr & INTR_HALTED)
+     break;
+ }
+ M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
+ } else {
@@ -2644,8 +2663,8 @@
+ TRACE_AND_STEP();
+ if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
+     /* REPE */
+     /* move them until CX is ZERO. */
+     while (M.x86.R_CX != 0) {
+     /* move them until (E)CX is ZERO. */
+     while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
+     if (M.x86.mode & SYSMODE_PREFIX_DATA) {
+         val1 = fetch_data_long(M.x86.R_SI);
+         val2 = fetch_data_long_abs(M.x86.R_ES, M.x86.R_DI);
@@ -2655,11 +2674,16 @@
+         val2 = fetch_data_word_abs(M.x86.R_ES, M.x86.R_DI);
+         cmp_word((u16)val1, (u16)val2);
+     }
+     M.x86.R_CX -= 1;
+     if (M.x86.mode & SYSMODE_32BIT_REP)
+     M.x86.R_ECX -= 1;
+     else
+     M.x86.R_CX -= 1;
+     M.x86.R_SI += inc;
+     M.x86.R_DI += inc;
+     if ( (M.x86.mode & SYSMODE_PREFIX_REPE) && ACCESS_FLAG(F_ZF) == 0 ) break;
+     if ( (M.x86.mode & SYSMODE_PREFIX_REPNE) && ACCESS_FLAG(F_ZF) ) break;
+     if (M.x86.intr & INTR_HALTED)
+     break;
+ }
+ M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
+ } else {
@@ -2741,11 +2765,16 @@
+ TRACE_AND_STEP();
+ if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
+     /* dont care whether REPE or REPNE */
+     /* move them until CX is ZERO. */
+     while (M.x86.R_CX != 0) {
+     /* move them until (E)CX is ZERO. */

```



```

+   while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
+       store_data_byte_abs(M.x86.R_ES, M.x86.R_DI, M.x86.R_AL);
-       M.x86.R_CX -- 1;
+       if (M.x86.mode & SYSMODE_32BIT_REP)
+           M.x86.R_ECX -- 1;
+       else
+           M.x86.R_CX -- 1;
+       M.x86.R_DI += inc;
+       if (M.x86.intr & INTR_HALTED)
+           break;
+   }
+   M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
+ } else {
@@ -2783,9 +2812,11 @@
+   count = 1;
+   if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
+       /* dont care whether REPE or REPNE */
-       /* move them until CX is ZERO. */
-       count = M.x86.R_CX;
+       /* move them until (E)CX is ZERO. */
+       count = (M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX;
+       M.x86.R_CX = 0;
+   if (M.x86.mode & SYSMODE_32BIT_REP)
+       M.x86.R_ECX = 0;
+       M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
+   }
+   while (count--) {
@@ -2795,6 +2826,8 @@
+       store_data_word_abs(M.x86.R_ES, M.x86.R_DI, M.x86.R_AX);
+   }
+   M.x86.R_DI += inc;
+   if (M.x86.intr & INTR_HALTED)
+   break;
+ }
+   DECODE_CLEAR_SEGOVR();
+   END_OF_INSTR();
@@ -2817,11 +2850,16 @@
+   inc = 1;
+   if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
+       /* dont care whether REPE or REPNE */
-       /* move them until CX is ZERO. */
-       while (M.x86.R_CX != 0) {
+       /* move them until (E)CX is ZERO. */
+       while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
+           M.x86.R_AL = fetch_data_byte(M.x86.R_SI);
-           M.x86.R_CX -- 1;
+           if (M.x86.mode & SYSMODE_32BIT_REP)
+               M.x86.R_ECX -- 1;

```

```

+     else
+         M.x86.R_CX -= 1;
+         M.x86.R_SI += inc;
+         if (M.x86.intr & INTR_HALTED)
+             break;
+     }
+     M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
+ } else {
@@ -2859,9 +2897,11 @@
+     count = 1;
+     if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
+         /* dont care whether REPE or REPNE */
+         /* move them until CX is ZERO. */
+         count = M.x86.R_CX;
+         /* move them until (E)CX is ZERO. */
+         count = (M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX;
+         M.x86.R_CX = 0;
+     if (M.x86.mode & SYSMODE_32BIT_REP)
+         M.x86.R_ECX = 0;
+     M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
+ }
+     while (count--) {
@@ -2871,6 +2911,8 @@
+         M.x86.R_AX = fetch_data_word(M.x86.R_SI);
+     }
+     M.x86.R_SI += inc;
+     if (M.x86.intr & INTR_HALTED)
+         break;
+ }
+     DECODE_CLEAR_SEGOVR();
+     END_OF_INSTR();
@@ -2894,26 +2936,36 @@
+     inc = 1;
+     if (M.x86.mode & SYSMODE_PREFIX_REPE) {
+         /* REPE */
+         /* move them until CX is ZERO. */
+         while (M.x86.R_CX != 0) {
+         /* move them until (E)CX is ZERO. */
+         while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
+             val2 = fetch_data_byte_abs(M.x86.R_ES, M.x86.R_DI);
+             cmp_byte(M.x86.R_AL, val2);
+             M.x86.R_CX -= 1;
+             if (M.x86.mode & SYSMODE_32BIT_REP)
+                 M.x86.R_ECX -= 1;
+             else
+                 M.x86.R_CX -= 1;
+             M.x86.R_DI += inc;
+             if (ACCESS_FLAG(F_ZF) == 0)

```

```

        break;
+       if (M.x86.intr & INTR_HALTED)
+       break;
    }
    M.x86.mode &= ~SYSMODE_PREFIX_REPE;
} else if (M.x86.mode & SYSMODE_PREFIX_REPNE) {
    /* REPNE */
-   /* move them until CX is ZERO. */
-   while (M.x86.R_CX != 0) {
+   /* move them until (E)CX is ZERO. */
+   while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
        val2 = fetch_data_byte_abs(M.x86.R_ES, M.x86.R_DI);
        cmp_byte(M.x86.R_AL, val2);
-       M.x86.R_CX -- 1;
+       if (M.x86.mode & SYSMODE_32BIT_REP)
+       M.x86.R_ECX -- 1;
+       else
+       M.x86.R_CX -- 1;
        M.x86.R_DI += inc;
        if (ACCESS_FLAG(F_ZF))
            break; /* zero flag set means equal */
+       if (M.x86.intr & INTR_HALTED)
+       break;
    }
    M.x86.mode &= ~SYSMODE_PREFIX_REPNE;
} else {
@@ -2951,8 +3003,8 @@
    TRACE_AND_STEP();
    if (M.x86.mode & SYSMODE_PREFIX_REPE) {
        /* REPE */
-       /* move them until CX is ZERO. */
-       while (M.x86.R_CX != 0) {
+       /* move them until (E)CX is ZERO. */
+       while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
            if (M.x86.mode & SYSMODE_PREFIX_DATA) {
                val = fetch_data_long_abs(M.x86.R_ES, M.x86.R_DI);
                cmp_long(M.x86.R_EAX, val);
@@ -2960,16 +3012,21 @@
                val = fetch_data_word_abs(M.x86.R_ES, M.x86.R_DI);
                cmp_word(M.x86.R_AX, (u16)val);
            }
-       M.x86.R_CX -- 1;
+       if (M.x86.mode & SYSMODE_32BIT_REP)
+       M.x86.R_ECX -- 1;
+       else
+       M.x86.R_CX -- 1;
        M.x86.R_DI += inc;
        if (ACCESS_FLAG(F_ZF) == 0)

```

```

        break;
+     if (M.x86.intr & INTR_HALTED)
+         break;
    }
    M.x86.mode &= ~SYSMODE_PREFIX_REPE;
} else if (M.x86.mode & SYSMODE_PREFIX_REPNE) {
    /* REPNE */
-     /* move them until CX is ZERO. */
-     while (M.x86.R_CX != 0) {
+     /* move them until (E)CX is ZERO. */
+     while (((M.x86.mode & SYSMODE_32BIT_REP) ? M.x86.R_ECX : M.x86.R_CX) != 0) {
        if (M.x86.mode & SYSMODE_PREFIX_DATA) {
            val = fetch_data_long_abs(M.x86.R_ES, M.x86.R_DI);
            cmp_long(M.x86.R_EAX, val);
@@ -2977,10 +3034,15 @@
            val = fetch_data_word_abs(M.x86.R_ES, M.x86.R_DI);
            cmp_word(M.x86.R_AX, (u16)val);
        }
-     M.x86.R_CX -= 1;
+     if (M.x86.mode & SYSMODE_32BIT_REP)
+         M.x86.R_ECX -= 1;
+     else
+         M.x86.R_CX -= 1;
        M.x86.R_DI += inc;
        if (ACCESS_FLAG(F_ZF))
            break; /* zero flag set means equal */
+     if (M.x86.intr & INTR_HALTED)
+         break;
    }
    M.x86.mode &= ~SYSMODE_PREFIX_REPNE;
} else {
@@ -3238,9 +3300,9 @@
    DECODE_PRINTF("RET\t");
    imm = fetch_word_imm();
    DECODE_PRINTF2("%x\n", imm);
- RETURN_TRACE("RET",M.x86.saved_cs,M.x86.saved_ip);
TRACE_AND_STEP();
    M.x86.R_IP = pop_word();
+ RETURN_TRACE(M.x86.saved_cs,M.x86.saved_ip, M.x86.R_CS, M.x86.R_IP, "NEAR");
    M.x86.R_SP += imm;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
@@ -3254,9 +3316,9 @@
{
    START_OF_INSTR();
    DECODE_PRINTF("RET\n");
- RETURN_TRACE("RET",M.x86.saved_cs,M.x86.saved_ip);
TRACE_AND_STEP();

```

```

    M.x86.R_IP = pop_word();
+ RETURN_TRACE(M.x86.saved_cs,M.x86.saved_ip, M.x86.R_CS, M.x86.R_IP, "NEAR");
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
}
@@ -3471,10 +3533,10 @@
    DECODE_PRINTF("RETF\t");
    imm = fetch_word_imm();
    DECODE_PRINTF2("%x\n", imm);
- RETURN_TRACE("RETF",M.x86.saved_cs,M.x86.saved_ip);
TRACE_AND_STEP();
    M.x86.R_IP = pop_word();
    M.x86.R_CS = pop_word();
+ RETURN_TRACE(M.x86.saved_cs,M.x86.saved_ip, M.x86.R_CS, M.x86.R_IP, "FAR");
    M.x86.R_SP += imm;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
@@ -3488,10 +3550,10 @@
{
    START_OF_INSTR();
    DECODE_PRINTF("RETF\n");
- RETURN_TRACE("RETF",M.x86.saved_cs,M.x86.saved_ip);
TRACE_AND_STEP();
    M.x86.R_IP = pop_word();
    M.x86.R_CS = pop_word();
+ RETURN_TRACE(M.x86.saved_cs,M.x86.saved_ip, M.x86.R_CS, M.x86.R_IP, "FAR");
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
}
@@ -4020,8 +4082,11 @@
    ip += (s16) M.x86.R_IP;
    DECODE_PRINTF2("%04x\n", ip);
    TRACE_AND_STEP();
-   M.x86.R_CX -= 1;
-   if (M.x86.R_CX != 0 && !ACCESS_FLAG(F_ZF)) /* CX != 0 and !ZF */
+   if (M.x86.mode & SYSMODE_PREFIX_ADDR)
+       M.x86.R_ECX -= 1;
+   else
+       M.x86.R_CX -= 1;
+   if (((M.x86.mode & SYSMODE_PREFIX_ADDR) ? M.x86.R_ECX : M.x86.R_CX) != 0 &&
!ACCESS_FLAG(F_ZF)) /* (E)CX != 0 and !ZF */
        M.x86.R_IP = ip;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
@@ -4041,8 +4106,11 @@
    ip += (s16) M.x86.R_IP;
    DECODE_PRINTF2("%04x\n", ip);
    TRACE_AND_STEP();

```

```

- M.x86.R_CX -= 1;
- if (M.x86.R_CX != 0 && ACCESS_FLAG(F_ZF)) /* CX != 0 and ZF */
+ if (M.x86.mode & SYSMODE_PREFIX_ADDR)
+ M.x86.R_ECX -= 1;
+ else
+ M.x86.R_CX -= 1;
+ if (((M.x86.mode & SYSMODE_PREFIX_ADDR) ? M.x86.R_ECX : M.x86.R_CX) != 0 &&
ACCESS_FLAG(F_ZF)) /* (E)CX != 0 and ZF */
    M.x86.R_IP = ip;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
@@ -4062,8 +4130,11 @@
    ip += (s16) M.x86.R_IP;
    DECODE_PRINTF2("%04x\n", ip);
    TRACE_AND_STEP();
- M.x86.R_CX -= 1;
- if (M.x86.R_CX != 0)
+ if (M.x86.mode & SYSMODE_PREFIX_ADDR)
+ M.x86.R_ECX -= 1;
+ else
+ M.x86.R_CX -= 1;
+ if (((M.x86.mode & SYSMODE_PREFIX_ADDR) ? M.x86.R_ECX : M.x86.R_CX) != 0) /* (E)CX != 0 */
    M.x86.R_IP = ip;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
@@ -4085,8 +4156,10 @@
    target = (u16)(M.x86.R_IP + offset);
    DECODE_PRINTF2("%x\n", target);
    TRACE_AND_STEP();
- if (M.x86.R_CX == 0)
+ if (M.x86.R_CX == 0) {
    M.x86.R_IP = target;
+ JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, M.x86.R_CS, M.x86.R_IP, " CXZ ");
+ }
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
}
@@ -4213,6 +4286,7 @@
    ip = (s16)fetch_word_imm();
    ip += (s16)M.x86.R_IP;
    DECODE_PRINTF2("%04x\n", ip);
+ JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, M.x86.R_CS, ip, " NEAR ");
    TRACE_AND_STEP();
    M.x86.R_IP = (u16)ip;
    DECODE_CLEAR_SEGOVR();
@@ -4233,6 +4307,7 @@
    cs = fetch_word_imm();
    DECODE_PRINTF2("%04x:", cs);

```

```

    DECODE_PRINTF2("%04x\n", ip);
+   JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, cs, ip, " FAR ");
    TRACE_AND_STEP();
    M.x86.R_IP = ip;
    M.x86.R_CS = cs;
@@ -4254,6 +4329,7 @@
    offset = (s8)fetch_byte_imm();
    target = (u16)(M.x86.R_IP + offset);
    DECODE_PRINTF2("%x\n", target);
+   JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, M.x86.R_CS, target, " BYTE ");
    TRACE_AND_STEP();
    M.x86.R_IP = target;
    DECODE_CLEAR_SEGOVR();
@@ -4357,6 +4433,8 @@
    DECODE_PRINTF("REPNE\n");
    TRACE_AND_STEP();
    M.x86.mode |= SYSMODE_PREFIX_REPNE;
+   if (M.x86.mode & SYSMODE_PREFIX_ADDR)
+       M.x86.mode |= SYSMODE_32BIT_REP;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
}
@@ -4371,6 +4449,8 @@
    DECODE_PRINTF("REPE\n");
    TRACE_AND_STEP();
    M.x86.mode |= SYSMODE_PREFIX_REPE;
+   if (M.x86.mode & SYSMODE_PREFIX_ADDR)
+       M.x86.mode |= SYSMODE_32BIT_REP;
    DECODE_CLEAR_SEGOVR();
    END_OF_INSTR();
}
@@ -5013,12 +5093,14 @@
    break;
    case 4:      /* jmp word ptr ... */
        destval = fetch_data_word(destoffset);
+       JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, M.x86.R_CS, destval, " WORD ");
        TRACE_AND_STEP();
        M.x86.R_IP = destval;
        break;
    case 5:      /* jmp far ptr ... */
        destval = fetch_data_word(destoffset);
        destval2 = fetch_data_word(destoffset + 2);
+       JMP_TRACE(M.x86.saved_cs, M.x86.saved_ip, destval2, destval, " FAR ");
        TRACE_AND_STEP();
        M.x86.R_IP = destval;
        M.x86.R_CS = destval2;

```

Index: prim\_ops.c

=====

```

RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/prim_ops.c,v
retrieving revision 1.1
retrieving revision 1.3
diff -u -u -r1.1 -r1.3
--- prim_ops.c 7 Sep 2007 10:01:21 -0000 1.1
+++ prim_ops.c 16 Jan 2008 14:18:15 -0000 1.3
@@ -1921,7 +1921,7 @@
void imul_long_direct(u32 *res_lo, u32* res_hi,u32 d, u32 s)
{
#ifdef __HAS_LONG_LONG__
-   s64 res = (s64)d * (s64)s;
+   s64 res = (s64)(s32)d * (s64)(s32)s;

    *res_lo = (u32)res;
    *res_hi = (u32)(res >> 32);
@@ -2013,7 +2013,7 @@
void mul_long(u32 s)
{
#ifdef __HAS_LONG_LONG__
-   u64 res = (u32)M.x86.R_EAX * (u32)s;
+   u64 res = (u64)M.x86.R_EAX * s;

    M.x86.R_EAX = (u32)res;
    M.x86.R_EDX = (u32)(res >> 32);
@@ -2312,16 +2312,15 @@
}
if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
    /* dont care whether REPE or REPNE */
-   /* in until CX is ZERO. */
-   u32 count = ((M.x86.mode & SYSMODE_PREFIX_DATA) ?
+   /* in until (E)CX is ZERO. */
+   u32 count = ((M.x86.mode & SYSMODE_32BIT_REP) ?
        M.x86.R_ECX : M.x86.R_CX);
-
    while (count--> {
        single_in(size);
        M.x86.R_DI += inc;
    }
    M.x86.R_CX = 0;
-   if (M.x86.mode & SYSMODE_PREFIX_DATA) {
+   if (M.x86.mode & SYSMODE_32BIT_REP) {
        M.x86.R_ECX = 0;
    }
    M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);
@@ -2355,15 +2354,15 @@
}
if (M.x86.mode & (SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE)) {
    /* dont care whether REPE or REPNE */

```



```

- /* out until CX is ZERO. */
- u32 count = ((M.x86.mode & SYSMODE_PREFIX_DATA) ?
+ /* out until (E)CX is ZERO. */
+ u32 count = ((M.x86.mode & SYSMODE_32BIT_REP) ?
      M.x86.R_ECX : M.x86.R_CX);
while (count-- ) {
    single_out(size);
    M.x86.R_SI += inc;
}
M.x86.R_CX = 0;
- if (M.x86.mode & SYSMODE_PREFIX_DATA) {
+ if (M.x86.mode & SYSMODE_32BIT_REP) {
    M.x86.R_ECX = 0;
}
M.x86.mode &= ~(SYSMODE_PREFIX_REPE | SYSMODE_PREFIX_REPNE);

```

Index: sys.c

=====

RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/sys.c,v

retrieving revision 1.1

retrieving revision 1.2

diff -u -u -r1.1 -r1.2

--- sys.c 7 Sep 2007 10:01:21 -0000 1.1

+++ sys.c 7 Sep 2007 10:03:13 -0000 1.2

@@ -45,11 +45,6 @@

#include <x86emu/regs.h>

#include "debug.h"

#include "prim\_ops.h"

ifndef LINUXBIOS\_VERSION

include "io.h"

else

include <sys/io.h>

endif

ifdef IN\_MODULE

include "xf86\_ansi.h"

@@ -220,7 +215,7 @@

{

DB(if (DEBUG\_IO\_TRACE())

printk("inb %#04x \n", addr);

- return inb(addr);

+ return 0;

}

\*\*\*\*\*

@@ -235,7 +230,7 @@

{

DB(if (DEBUG\_IO\_TRACE())

printk("inw %#04x \n", addr);

```

- return inw(addr);
+ return 0;
}

/*****
@@ -250,7 +245,7 @@
{
DB(if (DEBUG_IO_TRACE())
printk("inl %#04x \n", addr);
- return inl(addr);
+ return 0;
}

/*****
@@ -264,7 +259,6 @@
{
DB(if (DEBUG_IO_TRACE())
printk("outb %#02x -> %#04x \n", val, addr);
- outb(val, addr);
return;
}

@@ -279,7 +273,6 @@
{
DB(if (DEBUG_IO_TRACE())
printk("outw %#04x -> %#04x \n", val, addr);
- outw(val, addr);
return;
}

@@ -295,7 +288,6 @@
DB(if (DEBUG_IO_TRACE())
printk("outl %#08x -> %#04x \n", val, addr);

- outl(val, addr);
return;
}

@@ -405,6 +397,6 @@

void X86EMU_setMemBase(void *base, size_t size)
{
- M.mem_base = (int) base;
+ M.mem_base = (unsigned long) base;
M.mem_size = size;
}
Index: include/x86emu/debug.h
=====

```

RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/include/x86emu/debug.h,v

retrieving revision 1.1

retrieving revision 1.4

diff -u -u -r1.1 -r1.4

--- include/x86emu/debug.h 7 Sep 2007 10:01:21 -0000 1.1

+++ include/x86emu/debug.h 20 Mar 2008 15:25:27 -0000 1.4

@@ -40,8 +40,6 @@

#ifndef \_\_X86EMU\_DEBUG\_H

#define \_\_X86EMU\_DEBUG\_H

//#define DEBUG 0

#undef DEBUG

/\*----- Macros and type definitions -----\*/

/\* checks to be enabled for "runtime" \*/

@@ -78,6 +76,8 @@

# define DEBUG\_SYSINT() (M.x86.debug & DEBUG\_SYSINT\_F)

# define DEBUG\_TRACECALL() (M.x86.debug & DEBUG\_TRACECALL\_F)

# define DEBUG\_TRACECALLREGS() (M.x86.debug & DEBUG\_TRACECALL\_REGS\_F)

+# define DEBUG\_TRACEJMP() (M.x86.debug & DEBUG\_TRACEJMP\_F)

+# define DEBUG\_TRACEJMPREGS() (M.x86.debug & DEBUG\_TRACEJMP\_REGS\_F)

# define DEBUG\_SYS() (M.x86.debug & DEBUG\_SYS\_F)

# define DEBUG\_MEM\_TRACE() (M.x86.debug & DEBUG\_MEM\_TRACE\_F)

# define DEBUG\_IO\_TRACE() (M.x86.debug & DEBUG\_IO\_TRACE\_F)

@@ -96,6 +96,8 @@

# define DEBUG\_SYSINT() 0

# define DEBUG\_TRACECALL() 0

# define DEBUG\_TRACECALLREGS() 0

+# define DEBUG\_TRACEJMP() 0

+# define DEBUG\_TRACEJMPREGS() 0

# define DEBUG\_SYS() 0

# define DEBUG\_MEM\_TRACE() 0

# define DEBUG\_IO\_TRACE() 0

@@ -169,14 +171,20 @@

x86emu\_dump\_regs(); \

if (DEBUG\_TRACECALL()) \

printk("%04x:%04x: CALL %s%04x:%04x\n", u, v, s, w, x);

## define RETURN\_TRACE(n,u,v) \

## define RETURN\_TRACE(u,v,w,x,s) \

if (DEBUG\_TRACECALLREGS()) \

x86emu\_dump\_regs(); \

if (DEBUG\_TRACECALL()) \

- printk("%04x:%04x: %s\n",u,v,n);

+ printk("%04x:%04x: RET %s %04x:%04x\n",u,v,s,w,x);

## define JMP\_TRACE(u,v,w,x,s) \

+ if (DEBUG\_TRACEJMPREGS()) \

+ x86emu\_dump\_regs(); \

+ if (DEBUG\_TRACEJMP()) \

```

+   printk("%04x:%04x: JMP %s%04x:%04x\n", u , v, s, w, x);
#else
# define CALL_TRACE(u,v,w,x,s)
-# define RETURN_TRACE(n,u,v)
+# define RETURN_TRACE(u,v,w,x,s)
+# define JMP_TRACE(u,v,w,x,s)
#endif

#ifdef DEBUG
Index: include/x86emu/regs.h
=====
RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/include/x86emu/regs.h,v
retrieving revision 1.1
retrieving revision 1.4
diff -u -u -r1.1 -r1.4
--- include/x86emu/regs.h 7 Sep 2007 10:01:21 -0000 1.1
+++ include/x86emu/regs.h 15 Jan 2008 13:46:40 -0000 1.4
@@ -231,6 +231,9 @@
#define SYSMODE_PREFIX_REPNE  0x00000100
#define SYSMODE_PREFIX_DATA  0x00000200
#define SYSMODE_PREFIX_ADDR  0x00000400
+//phueper: for REP(E|NE) Instructions, we need to decide wether it should be using
+//the 32bit ECX register as or the 16bit CX register as count register
+#define SYSMODE_32BIT_REP    0x00000800
#define SYSMODE_INTR_PENDING  0x10000000
#define SYSMODE_EXTRN_INTR    0x20000000
#define SYSMODE_HALTED        0x40000000
@@ -250,7 +253,8 @@
    SYSMODE_SEGOVR_GS   |\
    SYSMODE_SEGOVR_SS   |\
    SYSMODE_PREFIX_DATA |\
-   SYSMODE_PREFIX_ADDR)
+   SYSMODE_PREFIX_ADDR  |\
+   SYSMODE_32BIT_REP)

#define INTR_SYNCH      0x1
#define INTR_ASYNCH     0x2
@@ -274,9 +278,9 @@
    */
    u32          mode;
    volatile int  intr; /* mask of pending interrupts */
- int          debug;
+ volatile int  debug;
#ifdef DEBUG
- int          check;
+ int          check;
    u16         saved_ip;
    u16         saved_cs;

```

```
int          enc_pos;
Index: include/x86emu/x86emu.h
```

```
=====
RCS file: /cvs/osdf/cvs/host/other-licence/x86emu/include/x86emu/x86emu.h,v
```

```
retrieving revision 1.1
```

```
retrieving revision 1.3
```

```
diff -u -u -r1.1 -r1.3
```

```
--- include/x86emu/x86emu.h 7 Sep 2007 10:01:21 -0000 1.1
```

```
+++ include/x86emu/x86emu.h 19 Oct 2007 08:42:15 -0000 1.3
```

```
@@ -47,6 +47,7 @@
```

```
#include <console.h>
```

```
#define printk(x...) printk(BIOS_DEBUG, x)
```

```
#else
```

```
+#include <stdio.h>
```

```
#define printk printf
```

```
#endif
```

```
@@ -189,6 +181,8 @@
```

```
#define DEBUG_TRACECALL_REGS_F 0x004000
```

```
#define DEBUG_DECODE_NOPRINT_F 0x008000
```

```
#define DEBUG_SAVE_IP_CS_F 0x010000
```

```
+#define DEBUG_TRACEJMP_F 0x020000
```

```
+#define DEBUG_TRACEJMP_REGS_F 0x040000
```

```
#define DEBUG_SYS_F (DEBUG_SVC_F|DEBUG_FS_F|DEBUG_PROC_F)
```

```
void X86EMU_trace_regs(void);
```

```
@@ -200,5 +194,4 @@
```

```
#ifdef __cplusplus
```

```
} /* End of "C" linkage for C++ */
```

```
#endif
```

```
-
```

```
#endif /* __X86EMU_X86EMU_H */
```

```
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```

```
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```

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```

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```
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```

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```
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```

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```

```
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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.



Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)
- b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on

which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

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<one line to give the library's name and a brief idea of what it does.>

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Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

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Version 2.1, February 1999

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To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

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We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

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Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a

restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and



modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a

derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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```
*/
```

```
{ TARGET_FREEBSD_NR__acl_aclcheck_fd, "__acl_aclcheck_fd", "%s(%d, %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_aclcheck_file, "__acl_aclcheck_file", "%s(\"%s\", %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_aclcheck_link, "__acl_aclcheck_link", "%s(\"%s\", %d, %d)", NULL, NULL  
},
```

```
{ TARGET_FREEBSD_NR__acl_delete_fd, "__acl_delete_fd", "%s(%d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_delete_file, "__acl_delete_file", "%s(\"%s\", %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_delete_link, "__acl_delete_link", "%s(\"%s\", %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_get_fd, "__acl_get_fd", "%s(%d, %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_get_file, "__acl_get_file", "%s(\"%s\", %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_get_link, "__acl_get_link", "%s(\"%s\", %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_set_fd, "__acl_set_fd", "%s(%d, %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_set_file, "__acl_set_file", "%s(\"%s\", %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__acl_set_link, "__acl_set_link", "%s(\"%s\", %d, %d)", NULL, NULL },  
{ TARGET_FREEBSD_NR__semctl, "__semctl", NULL, NULL, NULL },  
{ TARGET_FREEBSD_NR__syscall, "__syscall", NULL, NULL, NULL },  
{ TARGET_FREEBSD_NR__sysctl, "__sysctl", NULL, print_sysctl, NULL },
```

```

{ TARGET_FREEBSD_NR__umtx_op, "_umtx_op", "%s(%#x, %d, %d, %#x, %#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_accept, "accept", "%s(%d,%#x,%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_access, "access", "%s(\"%s\",%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_acct, "acct", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_adjtime, "adjtime", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_bind, "bind", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_break, "break", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_chdir, "chdir", "%s(\"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_chflags, "chflags", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_chmod, "chmod", "%s(\"%s\",%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_chown, "chown", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_chroot, "chroot", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_clock_getres, "clock_getres", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_clock_gettime, "clock_gettime", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_clock_settime, "clock_settime", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_close, "close", "%s(%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_connect, "connect", "%s(%d,%#x,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_dup, "dup", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_dup2, "dup2", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_eaccess, "eaccess", "%s(\"%s\",%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_execve, "execve", NULL, print_execve, NULL },
{ TARGET_FREEBSD_NR_exit, "exit", "%s(%d)\n", NULL, NULL },
{ TARGET_FREEBSD_NR_extattrctl, "extattrctl", "%s(\"%s\", %d, \"%s\", %d, \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_delete_fd, "extattr_delete_fd", "%s(%d, %d, \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_delete_file, "extattr_delete_file", "%s(\"%s\", %d, \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_delete_link, "extattr_delete_link", "%s(\"%s\", %d, \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_get_fd, "extattr_get_fd", "%s(%d, %d, \"%s\", %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_get_file, "extattr_get_file", "%s(\"%s\", %d, \"%s\", %#x, %d)", NULL, NULL },
},
{ TARGET_FREEBSD_NR_extattr_get_file, "extattr_get_link", "%s(\"%s\", %d, \"%s\", %#x, %d)", NULL,
NULL },
{ TARGET_FREEBSD_NR_extattr_list_fd, "extattr_list_fd", "%s(%d, %d, %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_list_file, "extattr_list_file", "%s(\"%s\", %d, %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_list_link, "extattr_list_link", "%s(\"%s\", %d, %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_set_fd, "extattr_set_fd", "%s(%d, %d, \"%s\", %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_extattr_set_file, "extattr_set_file", "%s(\"%s\", %d, \"%s\", %#x, %d)", NULL, NULL },
},
{ TARGET_FREEBSD_NR_extattr_set_link, "extattr_set_link", "%s(\"%s\", %d, \"%s\", %#x, %d)", NULL,
NULL },
{ TARGET_FREEBSD_NR_fchdir, "fchdir", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fchflags, "fchflags", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fchmod, "fchmod", "%s(%d,%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_fchown, "fchown", "%s(%d,%d,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_fcntl, "fcntl", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fexecve, "fexecve", NULL, print_execve, NULL },
{ TARGET_FREEBSD_NR_fhopen, "fhopen", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fhstat, "fhstat", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fhstatfs, "fhstatfs", NULL, NULL, NULL },

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{ TARGET_FREEBSD_NR_flock, "flock", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fork, "fork", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_fpathconf, "fpathconf", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_fstat, "fstat", "%s(%d,%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_fstatat, "fstatat", "%s(%d,\"%s\", %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_fstatfs, "fstatfs", "%s(%d,%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_fsync, "fsync", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_ftruncate, "ftruncate", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_futimes, "futimes", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getcontext, "getcontext", "%s(%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_getdirentries, "getdirentries", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_freebsd6_mmap, "freebsd6_mmap", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getegid, "getegid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_geteuid, "geteuid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_getfh, "getfh", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getfsstat, "getfsstat", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getgid, "getgid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_getgroups, "getgroups", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getitimer, "getitimer", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getlogin, "getlogin", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getpeername, "getpeername", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getpgid, "getpgid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getpgrp, "getpgrp", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_getpid, "getpid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_getppid, "getppid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_getpriority, "getpriority", "%s(%#x,%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_getresgid, "getresgid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getresuid, "getresuid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getrlimit, "getrlimit", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getrusage, "getrusage", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getsid, "getsid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getsockname, "getsockname", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getsockopt, "getsockopt", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_gettimeofday, "gettimeofday", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_getuid, "getuid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_ioctl, "ioctl", NULL, print_ioctl, NULL },
{ TARGET_FREEBSD_NR_issetugid, "issetugid", "%s()", NULL, NULL },
{ TARGET_FREEBSD_NR_kevent, "kevent", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_kill, "kill", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_kqueue, "kqueue", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_ktrace, "ktrace", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_lchown, "lchown", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_link, "link", "%s(\"%s\", \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_listen, "listen", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_lpathconf, "lpathconf", "%s(\"%s\", %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_lseek, "lseek", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_lstat, "lstat", "%s(\"%s\", %p)", NULL, NULL },
{ TARGET_FREEBSD_NR_madvise, "madvise", NULL, NULL, NULL },

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{ TARGET_FREEBSD_NR_mincore, "mincore", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_minherit, "minherit", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_mkdir, "mkdir", "%s(\\%s\\,%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_mkfifo, "mkfifo", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_mknod, "mknod", "%s(\\%s\\,%#o,%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_mlock, "mlock", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_mlockall, "mlockall", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_mmap, "mmap", NULL, NULL, print_syscall_ret_addr },
{ TARGET_FREEBSD_NR_mount, "mount", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_mprotect, "mprotect", "%s(%#x,%#x,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_msgctl, "msgctl", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_msgget, "msgget", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_msgrcv, "msgrcv", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_msgsnd, "msgsnd", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_msync, "msync", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_munlock, "munlock", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_munlockall, "munlockall", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_munmap, "munmap", "%s(%p,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_nanosleep, "nanosleep", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_nfssvc, "nfssvc", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_open, "open", "%s(\\%s\\,%#x,%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_openat, "openat", "%s(%d,\\%s\\,%#x,%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_pathconf, "pathconf", "%s(\\%s\\,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_pipe, "pipe", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_poll, "poll", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_pread, "pread", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_preadv, "preadv", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_profil, "profil", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_ptrace, "ptrace", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_pwrite, "pwrite", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_pwritev, "pwritev", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_quotactl, "quotactl", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_read, "read", "%s(%d,%#x,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_readlink, "readlink", "%s(\\%s\\,%p,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_readv, "readv", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_reboot, "reboot", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_recvfrom, "recvfrom", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_recvmsg, "recvmsg", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_rename, "rename", "%s(\\%s\\,\\%s\\)", NULL, NULL },
{ TARGET_FREEBSD_NR_revoke, "revoke", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_rfork, "rfork", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_rmdir, "rmdir", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_rtprio_thread, "rtprio_thread", "%s(%d,%d,%p)", NULL, NULL },
{ TARGET_FREEBSD_NR_sbrk, "sbrk", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sched_yield, "sched_yield", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_select, "select", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_semget, "semget", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_semop, "semop", NULL, NULL, NULL },

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{ TARGET_FREEBSD_NR_sendmsg, "sendmsg", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sendto, "sendto", NULL, NULL, NULL },
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{ TARGET_FREEBSD_NR_setegid, "setegid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_seteuid, "seteuid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setgid, "setgid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setgroups, "setgroups", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setitimer, "setitimer", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setlogin, "setlogin", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setpgid, "setpgid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setpriority, "setpriority", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setregid, "setregid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setresgid, "setresgid", NULL, NULL, NULL },
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{ TARGET_FREEBSD_NR_setrlimit, "setrlimit", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setsid, "setsid", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setsockopt, "setsockopt", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_settimeofday, "settimeofday", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_setuid, "setuid", NULL, NULL, NULL },
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{ TARGET_FREEBSD_NR_shmdt, "shmdt", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_shmget, "shmget", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_shutdown, "shutdown", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sigaction, "sigaction", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sigaltstack, "sigaltstack", "%s(%p,%p)", NULL, NULL },
{ TARGET_FREEBSD_NR_sigpending, "sigpending", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sigprocmask, "sigprocmask", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sigreturn, "sigreturn", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sigsuspend, "sigsuspend", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_socket, "socket", "%s(%d,%d,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_socketpair, "socketpair", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sstk, "sstk", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_stat, "stat", "%s(\"%s\",%p)", NULL, NULL },
{ TARGET_FREEBSD_NR_statfs, "statfs", "%s(\"%s\",%p)", NULL, NULL },
{ TARGET_FREEBSD_NR_symlink, "symlink", "%s(\"%s\", \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_sync, "sync", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_sysarch, "sysarch", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_syscall, "syscall", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_thr_create, "thr_create", "%s(%#x, %#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_exit, "thr_exit", "%s(%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_kill, "thr_kill", "%s(%d, %#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_kill2, "thr_kill2", "%s(%d, %d, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_new, "thr_new", "%s(%#x, %d)", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_self, "thr_self", "%s(%#x)", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_set_name, "thr_set_name", "%s(%d, \"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_thr_suspend, "thr_suspend", "%s(%d, %#x)", NULL, NULL },

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{ TARGET_FREEBSD_NR_thr_wake, "thr_wake", "%s(%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_truncate, "truncate", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_umask, "umask", "%s(%#o)", NULL, NULL },
{ TARGET_FREEBSD_NR_unlink, "unlink", "%s(\"%s\")", NULL, NULL },
{ TARGET_FREEBSD_NR_unmount, "unmount", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_utimes, "utimes", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_vfork, "vfork", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_wait4, "wait4", NULL, NULL, NULL },
{ TARGET_FREEBSD_NR_write, "write", "%s(%d,%#x,%d)", NULL, NULL },
{ TARGET_FREEBSD_NR_writew, "writew", "%s(%d,%p,%#x)", NULL, NULL },

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## 1.73 qemu/seabios 2.3.0

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### 1.74.1 Available under license :

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## 1.80 websocket-client 0.40.0

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