TTC News Custom Control v1.00a

Enhancements

The News Custom Control

The News Custom Control allows you to send email to your news server. The following properties can be called from 32-bit container / development environments to post or read articles from USENET news.

NEWS.AboutBox()

This method displays the About dialog box for the control to provide copyright information.

NEWS.ErrorNum

This member is an integer containing the last error encountered.

NEWS. ConnectNewsService(*hostadrs As String*)

This method establishes a link between the client machine and the remote news server. The *hostadrs* argument contains the IP address of the news server to use for reading and posting mail. The IP address of the news server can be obtained from the GetHost Custom Control.

This method returns a 1 on success and a 0 if an error occurs and places an error value into **ErrorNum**.

NEWS. DisconnectNewsService()

This method disconnects the link to the news server established with the call to **ConnectNewsService(*hostadrs As String*)**.

This method returns a 1 on success and a 0 if an error occurs and places an error value into **ErrorNum**.

NEWS. ListArticles(*groupname As String, daydiff As Integer*)

This method lists all new articles that have been posted as of a certain date. The *groupname* parameter allows you to specify a particular group in which you wish to list the new articles. The *daydiff* is a positive integer value that specifies the number of days prior to the current day for which you wish to search for new articles.

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing a list of new article identifiers are returned in the format shown below :

```
<abcdef123@mit.edu>
<123Aug#@du.edu>
.
```

Each article identifier is stored on one line followed by a carriage return / line feed. These identifiers are used to retrieve article from the news server using **GetArticle(articlenum$)** or **ArticleStatus(articlenum$)**.

NOTE : *Upon completion of this operation you should disconnect from the news server then reconnect before the next operation.*

NEWS.ArticleStatus(*articlenumber As String*)

This method retrieves the status of the article specified by the *articlenumber* from the newsgroup selected with **SelectGroup(*groupname As String*)**. Articles may also be specified by using the identifier retrieved with **ListArticles(*groupname As String, daydiff As Integer*)** or **ArticleStatus(*articlenumber As String*)**.

NOTE : *Upon completion of this operation you should disconnect from the news server then reconnect before the next operation unless you are performing a sequential retrieval of articles from the news server.*

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing a list of new article identifiers are returned in the format shown below :

```
59158 <24Aug95035316etoupin@toupin.com> status
```

The first field of the status contains the numeric article number relative to the newsgroup (59158) and the identifier of the article relative to the news server (<24Aug95035316etoupin@toupin.com>). Either the article number or the identifier can be used to load an article with **GetArticle(articlenum$)** or its status with **ArticleStatus(articlenum$)**.

NEWS.GetArticle(*articlenumber As String*)

This method retrieves the article specified by the *articlenumber* from the newsgroup selected with **SelectGroup(*groupname As String*)**. Articles may also be specified by using the identifier retrieved with **ListArticles(*groupname As String, daydiff As Integer*)** or **ArticleStatus(*articlenumber As String*)**.

NOTE : *Upon completion of this operation you should disconnect from the news server then reconnect before the next operation unless you are performing a sequential retrieval of articles from the news server.*

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing the specified article is returned in the format shown below :

```
Path: news-2.csn.net!news-1a.csn.net!news.csn.net!toupin.com
From: etoupin@toupin.com (Edward B. Toupin)
Newsgroups: comp.os.vms
Subject: TEST -- PLS IGNORE
Date: 04 Aug 95 03:53:16 GMT
Organization: TTC
Lines: 2
Message-ID: <24Aug95035316etoupin@toupin.com>
NNTP-Posting-Host: 204.131.233.1
X-Newsreader: TTC News Custom Control v1.00a

This is a test message from my News Custom Control.
.
```

The first lines of the article contain the header information for the article to provide routing information as well as the originator of the message, number of lines, time and date of posting, and the distribution newsgroups for the article. The bottom half of the article contains the actual text for reading by the USENET user.

NOTE : *The article is always terminated with a single period on the last line*.

NEWS.SelectGroup(*groupname As String*)

This method commands the news server to provide an article pointer to the newsgroup specified in *groupname* so that you can retrieve specific articles within the newsgroup.

NOTE : *Upon completion of this operation you should **not** disconnect from the news server. Disconnecting after this method will cause the news server to reset its pointers for your session thus losing your place within the newsgroups.*

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing the number of articles as well as the numbers of the first and last articles is returned in the format shown below :

```
211 2522 55743 59234 comp.os.vms
```

The first field from the left is an identifier which states that the selection was successful. The next field (2522) is the estimated number of articles in the newsgroup while the next two field show the article numbers of the first and the last articles. These article numbers, and all in between, can be used with **GetArticle(articlenum$)** or **ArticleStatus(articlenum$)**. The last field to the right is the name of the newsgroup selected.

NEWS.GetPreviousHeader()

This method moves to the previous article in the newsgroup selected with **SelectGroup(*groupname As String*)** and returns the header of that article. This method relies on an article pointer managed on the news server for your session. Any operation that retrieves articles or article headers from the news server changes the position of the pointer thus affecting the relative previous article header accessed by this method.

NOTE : *Upon completion of this operation you should **not** disconnect from the news server. Disconnecting after this method will cause the news server to reset its pointers for your session thus losing your place within the selected newsgroups articles.*

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing the header of the selected article is returned in the format shown below :

```
59158 <24Aug95035316etoupin@toupin.com> head
Path: news-2.csn.net!news-1a.csn.net!news.csn.net!toupin.com
From: etoupin@toupin.com (Edward B. Toupin)
Newsgroups: comp.os.vms
Subject: TEST -- PLS IGNORE
Date: 04 Aug 95 03:53:16 GMT
Organization: TTC
Lines: 2
Message-ID: <24Aug95035316etoupin@toupin.com>
NNTP-Posting-Host: 204.131.233.1
X-Newsreader: TTC News Custom Control v1.00a
.
```

The first line of the header contains the numeric article number relative to the newsgroup (59158), the identifier of the article relative to the news server (<24Aug95035316etoupin@toupin.com>). Either the article number or the identifier can be used to load an article with **GetArticle(articlenum$)** or its status with

ArticleStatus(articlenum$). The remaining lines of the header describe the message including the originator of the message, number of lines, time and date of posting, and the distribution newsgroups for the article.

NOTE : *The header is always terminated with a single period on the last line.*

NEWS.GetNextHeader()

This method moves to the next article in the newsgroup selected with **SelectGroup(*groupname As String*)** and returns the header of that article. This method relies on an article pointer managed on the news server for your session. Any operation that retrieves articles or article headers from the news server changes the position of the pointer thus affecting the relative next article header accessed by this method.

NOTE : *Upon completion of this operation you should **not** disconnect from the news server. Disconnecting after this method will cause the news server to reset its pointers for your session thus losing your place within the selected newsgroups articles.*

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing the header of the selected article is returned in the format shown below :

```
59158 <24Aug95035316etoupin@toupin.com> head
Path: news-2.csn.net!news-1a.csn.net!news.csn.net!toupin.com
From: etoupin@toupin.com (Edward B. Toupin)
Newsgroups: comp.os.vms
Subject: TEST -- PLS IGNORE
Date: 04 Aug 95 03:53:16 GMT
Organization: TTC
Lines: 2
Message-ID: <24Aug95035316etoupin@toupin.com>
NNTP-Posting-Host: 204.131.233.1
X-Newsreader: TTC News Custom Control v1.00a
.
```

The first line of the header contains the numeric article number relative to the newsgroup (59158), the identifier of the article relative to the news server (<24Aug95035316etoupin@toupin.com>). Either the article number or the identifier can be used to load an article with **GetArticle(articlenum$)** or its status with **ArticleStatus(articlenum$)**. The remaining lines of the header describe the message including the originator of the message, number of lines, time and date of posting, and the distribution newsgroups for the article.

NOTE : *The header is always terminated with a single period on the last line.*

NEWS.ListNewsGroups(*daydiff As Integer*)

This method retrieves all newsgroups from the news server that have been created since the relative date referenced by the value in *daydiff*. The *daydiff* argument is a positive integer value used to calculate the number of days prior to the current day in which to use when searching for new newsgroups. If a value of zero (0) is used for *daydiff* all available newsgroups are returned regardless of the date that they were added to the news server.

NOTE : *If you use a 0 for daydiff expect to have a long delay in reception of the newsgroup list. Many news servers have in excess of 6,000 newsgroups!*

NOTE : *Upon completion of this operation you should disconnect from the news server.*

This method returns a NULL string on error and places an error value into **ErrorNum**. If successful a string containing the newsgroups is returned in the format shown below :

```
New newsgroups follow.
alt.cheese 0 1 y
alt.tv.man-from-uncle 0 1 y
alt.tv.wild-palms 0 1 y
.
```

Each newsgroup and its attributes are stored on successive lines followed by a carriage return - line feed. The first field of each entry is the newsgroup name which can be used in the **SelectGroup(*groupname As String*)** method. The next two fields are numeric values, 0 and 1 for these examples, and represent the first and last article numbers respectively in the newsgroup. The final field can be *y* or *n*. A *y* means that posting is allowed in this newsgroup while an *n* means that posting is prohibited.

NOTE : *The list is always terminated with a single period on the last line.*

NEWS.PostArticle(*fromuser As String, username As String, fromhostname As String, newsserver As String, newsgroups As String, subject As String, organization As String, body As String*)

This method posts an article to a newsgroup on the news server. The *fromuser* argument is the users login name specified on the host originating the email while *username* is the full name of the user posting the email. The *fromhostname* argument contains the fully qualified name of the host originating the email and *newsserver* is the fully qualified name of the news server.

The *newsgroups* argument contains a comma delimited list of newsgroups to which the article is to be posted. If there is only one newsgroup do not include commas and no comma should appear after the last newsgroup in a list of multiple newsgroups. The *subject* argument is the topic to be discussed within the information passed as the *body* of the article. The *organization* argument identifies the originating organization of the article.

NOTE : *Upon completion of this operation you should disconnect from the news server.*

This method returns a 0 on error and places an error value into **ErrorNum**. If successful a 1 is returned and the article is posed in the format shown below :

```
Path: news-2.csn.net!news-1a.csn.net!news.csn.net!toupin.com
From: etoupin@toupin.com (Edward B. Toupin)
Newsgroups: comp.os.ms-windows
Subject: TEST -- PLS IGNORE
Date: 04 Aug 95 03:59:04 GMT
Organization: TTC
Lines: 6
Message-ID: <24Aug95035904etoupin@toupin.com>
NNTP-Posting-Host: 204.131.233.1
X-Newsreader: TTC News Custom Control v1.00a

This is a test article from TTC News Custom Control v1.00a.
```

Thanks,

Ed Toupin

Sample News Code

The following code demonstrates the use of the News Custom Control. This control allows you to retrieve and post articles to USENET newsgroups on the Internet.

POSTING ARTICLES

The following subroutine provides a means of posting an article to a news server. The subroutine first resolves the address of the server using the GetAdrs control of GetHost. The next step, once the IP address is received, is to connect to the news server using the **ConnectNewsService(IPAdrs$)** method. If the connection is successful the **PostArticle(...)** method is called with appropriate arguments to post the article on the specified news server. The main body of the article is loaded from the Text2 edit control of this applications main form. Once the article is posted the subroutine disconnects from the news server using **DisconnectNewsService()**.

```
Private Sub Command1_Click()
   IPAdrs$ = GetAdrs1.GetHostAdrs("news.service.net")
   retval = News1.ConnectNewsService(IPAdrs$)
   If retval = 0 Then
         MsgBox Str$(News1.ErrorNum)
   End If
   retval = News1.PostArticle("etoupin", "Edward B. Toupin", _
   "toupin.com", "news.service.net", "comp.os.ms-windows", _
   "TEST -- PLS IGNORE", "TTC", Text2.TEXT)
   If retval = 0 Then
         MsgBox Str$(News1.ErrorNum)
   End If
   retval = News1.DisconnectNewsService()
   If retval = 0 Then
         MsgBox Str$(News1.ErrorNum)
   End If
End Sub
```

LISTING NEWSGROUPS

The following subroutine retrieves a list of available newsgroups from the connected news server. As usual the subroutine first resolves the address of the server using the GetAdrs control of GetHost. The subroutine then connects to the news server using the **ConnectNewsService(IPAdrs$)** method. If the connection is successful the standard Visual Basic **InputBox(...)** method requests input from the user as to the number of days prior to the current day new newsgroups should be searched. The **ListNewsGroups(Val(daydiff))** method is then called to query the news server for new, or all, newsgroups. Once the list is retrieved the subroutine disconnects from the news server using **DisconnectNewsService()**.

```
Private Sub Command3_Click()
   IPAdrs$ = GetAdrs1.GetHostAdrs("news.service.net")
```

```
    retval = News1.ConnectNewsService(IPAdrs$)
    If retval = 0 Then
          MsgBox Str$(News1.ErrorNum)
    End If
    daydiff = InputBox("Enter daydiff")
    retstr$ = News1.ListNewsGroups(Val(daydiff))
    If retstr$ = "" Then
          MsgBox Str$(News1.ErrorNum)
    Else
          Text1.TEXT = retstr$
    End If
    retval = News1.DisconnectNewsService()
    If retval = 0 Then
          MsgBox Str$(News1.ErrorNum)
    End If
End Sub
```

RETRIEVEING NEWS ARTICLES

The following subroutine retrieves a list of recent articles from the connected news server. If the connection to the news server is successful the standard Visual Basic **InputBox(...)** method requests input from the user as to the name of the newsgroup and the number of days prior to the current day new newsgroups should be searched. The **ListArticles(groupname$, Val(daydiff))** method is then called to query the news server for new articles posted since the current day less the number of days specified in *daydiff*. Once the list is retrieved the subroutine disconnects from the news server using **DisconnectNewsService()**.

```
Private Sub Command8_Click()
    IPAdrs$ = GetAdrs1.GetHostAdrs("news.service.net")
    retval = News1.ConnectNewsService(IPAdrs$)
    If retval = 0 Then
          MsgBox Str$(News1.ErrorNum)
    End If
    groupname$ = InputBox("Enter groupname")
    daydiff = InputBox("Enter daydiff")
    retstr$ = News1.ListArticles(groupname$, Val(daydiff))
    If retstr$ = "" Then
          MsgBox Str$(News1.ErrorNum)
    Else
          Text1.TEXT = retstr$
    End If
```

```
    retval = News1.DisconnectNewsService()
    If retval = 0 Then
          MsgBox Str$(News1.ErrorNum)
    End If
End Sub
```

BROWSING NEWS ARTICLES

The following subroutines work together to browse articles in a particular newsgroup on a connected news server. Unlike the previous examples you cannot log on and off of the server between the following calls. The **GetNextHeader()** and **GetPreviousHeader()** methods require the use of an article pointer located on the news server. Logging off then back onto the news server causes the article pointer to be reset for your session.

In the following subroutine we are resolving the address of the news server and logging onto the host.

```
Private Sub Command6_Click()
    IPAdrs$ = GetAdrs1.GetHostAdrs("news.service.net")
    retval = News1.ConnectNewsService(IPAdrs$)
    If retval = 0 Then
          MsgBox Str$(News1.ErrorNum)
    End If
    groupname$ = InputBox("Enter newsgroup")
    retstr$ = News1.SelectGroup(groupname$)
    If retstr$ = "" Then
          MsgBox Str$(News1.ErrorNum)
    Else
          Text1.TEXT = retstr$
    End If
End Sub
```

The following subroutine allows you to retrieve the status of an article by the articles number. You can either use the numeric value of the articles number as retrieved from the **GetNextHeader()** and **GetPreviousHeader()** methods or you can use the identifier retrieved from the **ListArticle (groupname$, Val(daydiff))** method.

NOTE : *You do not have to have a newsgroup selected to use the **ArticleStatus(articlenum$)** method. If you use the numeric number for the article you must select a newsgroup while using the identifier retrieves any article from any newsgroup.*

```
Private Sub Command5_Click()
    articlenum$ = InputBox("Enter article number")
    retstr$ = News1.ArticleStatus(articlenum$)
    If retstr$ = "" Then
          MsgBox Str$(News1.ErrorNum)
```

```
    Else
          Text1.TEXT = retstr$
    End If
End Sub
```

In a similar manner the following subroutine allows you to retrieve an article by the articles number. You can either use the numeric value of the articles number as retrieved from the **GetNextHeader()** and **GetPreviousHeader()** methods or you can use the identifier retrieved from the **ListArticle (groupname$, Val(daydiff))** method.

NOTE : *You do not have to have a newsgroup selected to use the **GetArticle(articlenum$)** method. If you use the numeric number for the article you must select a newsgroup while using the identifier retrieves any article from any newsgroup.*

```
Private Sub Command4_Click()
    articlenum$ = InputBox("Enter article number")
    retstr$ = News1.GetArticle(articlenum$)
    If retstr$ = "" Then
        MsgBox Str$(News1.ErrorNum)
    Else
        Text1.TEXT = retstr$
    End If
End Sub
```

The **GetNextHeader()** and **GetPreviousHeader()** methods scroll through the list of articles in the selected newsgroup. Each time you call either of these methods an article pointer located on the news server is increment or decremented until the bottom or top of the newsgroups list is reached.

```
Private Sub Command7_Click()
    retstr$ = News1.GetNextHeader()
    If retstr$ = "" Then
        MsgBox Str$(News1.ErrorNum)
    Else
        Text1.TEXT = retstr$
    End If
End Sub

Private Sub Command9_Click()
    retstr$ = News1.GetPreviousHeader()
    If retstr$ = "" Then
        MsgBox Str$(News1.ErrorNum)
    Else
```

```
        Text1.TEXT = retstr$
    End If
End Sub
```

Once the above operations are complete for your news session you should disconnect from the news server.

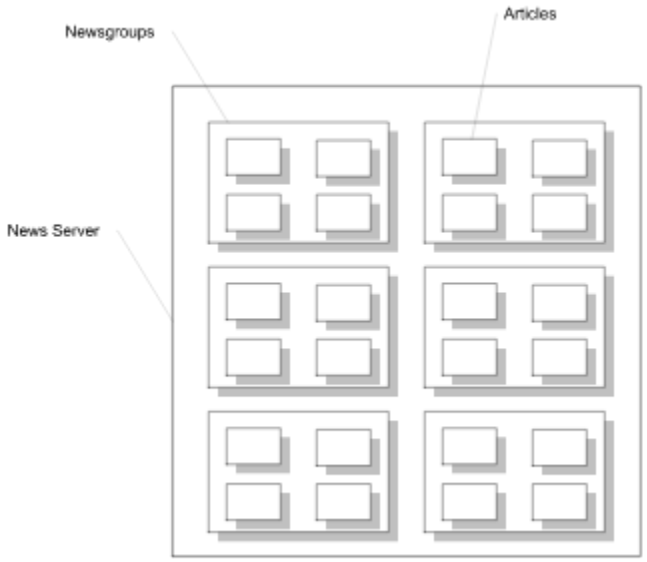
NOTE : *Since the news server methods of* ***SelectGroup(groupname$)****,* ***GetNextHeader()*** *and* ***GetPreviousHeader()*** *rely on an article pointer managed by the news server you should not log off until the entire news reading session is completed. In this manner the pointer is properly handled on the news server for proper scrolling of messages.*

```
Private Sub Command2_Click()
    retval = News1.DisconnectNewsService()
    If retval = 0 Then
        MsgBox Str$(News1.ErrorNum)
    End If
End Sub
```

What Is News

USENET News is handled on the Internet using the Network News Transfer Protocol (NNTP). NNTP specifies a protocol for the distribution, query, retrieval, and posting of news articles using a stream-based transmission of information among the ARPA-Internet community. NNTP is designed so that articles can be stored in a central database allowing subscribers selection of only those items they wish to read. NNTP is modelled upon the news article specifications for the USENET news system, however, NNTP does not require exact structure, content, or storage of news articles, and can be adapted to other non-USENET news systems.

Each news server maintains a method for accessing articles by remote users. The news servers service contains a set of newsgroups that are used to categorize the articles posted by the users. Within each newsgroup there exists a series of articles which contain the information posted by and read by Internet users.



Agreement

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By using the software, including any of the associated files, you agree to the terms of this agreement. If you do not agree, you should immediately return the software and documentation.

Please complete the included registration and feedback and include any comments or suggestions for future enhancements regarding the software. This registration will help us stay in touch with our customers and their needs. Email the feedback and US mail the registration as well as any comments or suggestions to Edward B. Toupin at etoupin@toupin.com or Compuserve 75051,1160.

Connectivity Custom Controls

Plug-n-Play for the Highway

Plug-n-Play

With the evolution of component software users have come to appreciate the ability to simply connect applications together to create a seamless application that meets their specific needs. The Connectivity Custom Control Pack provides you with that plug-n-play capability for network communications across the Information Superhighway.

No Programming Knowledge Necessary

The advantage to the Connectivity Custom Control Pack is that it can be used by anyone with any level of programming knowledge. The management of communications and application protocols are encapsulated in several small control libraries which allow you to connect to and manage information on the Information Superhighway.

All you need to use the Connectivity Custom Control Pack is Windows Sockets v1.1, a container/controlling application for 32bit operating systems, and a SLIP/PPP Internet connection.

Connectivity Custom Controls

The Connectivity Custom Control Pack comes with the following controls :

1. **ARCHIE CLIENT** Utilize ARCHIE services.
2. **CHATTER** Create applications to talk with other users on the Internet.
3. **CONNECT** Connect to providers and remote servers using dialup PPP.
4. **FINGER** Query hosts for user information.
5. **FTP** File transfer via File Transfer Protocol.
6. **GETHOST** Address and name resolution using the Domain Name System.
7. **GOPHER CLIENT** Utilize GOPHER services.
8. **IRC** Internet Relay Chat
9. **MAIL** Send (SMTP) and receive (POPv3) electronic mail.
10. **MIME** MIME encryption.
11. **NEWS** Retrieve, read, and submit to newsgroups.
12. **RAS** Access Remote Access Service functionality.
13. **SNMP** Network management via Simple Network Management Protocol.
14. **TELNET** Telnet terminal emulation.
15. **TIME** Set your computers time from a remote host.
16. **UUENCODE** UUENCODE encryption.
17. **WAIS CLIENT** Utilize Wide Are Information Server services.
18. **WEB CLIENT** Retrieve and view WWW home pages.
19. **WEB SERVER** Create and administer a WWW server.
20. **WHOIS** Locate hosts and users on the Internet.
21. **WSOCK** Develop low-level socket applications.

Error Codes

When an error occurs the member functions will return a NULL string or a 0 and an error value will be placed into the **ErrorNum** member variable. The following list contains possible error numbers that will occur and can only be handled within your container :

0	OK	Socket operation okay or timeout.
9	SOCK_BAD	Generic error for invalid format, bad format.
13	SOCK_ACCESS	Generic error for access violation.
14	SOCK_FAULT	Generic error for fault.
22	SOCK_INVALID	Generic error for invalid format, entry, etc.
24	SOCK_FILE	Generic error for file error.
25	SOCK_BADDR	The IP address provided is not valid or the host specified by the IP does not exist.
48	SOCK_ADDRINUSE	The specified address is already in use.
49	SOCK_ADDRNOTAVAIL	The specified address is not available.
50	SOCK_NETDOWN	The connected network is not available.
51	SOCK_NETUNREACH	The connected network is not reachable.
52	SOCK_NETRESET	The connected network connection has been reset.
53	SOCK_CONNABORTED	The current connection has been aborted by the network or intermediate services.
54	SOCK_CONNRESET	The current socket connection has been reset.
57	SOCK_NOTCONN	The current socket has not been connected.
58	SOCK_SHUTDOWN	The connection has been shutdown.
60	SOCK_TIMEDOUT	The current connection has timedout.
61	SOCK_CONNREFUSED	The requested connection has been refused by the remote host.
63	SOCK_NAMETOOLONG	Specified host name is too long.
64	SOCK_HOSTDOWN	Remote host is currently unavailable.
65	SOCK_HOSTUNREACH	Remote host is currently unreachable.
91	SOCK_SYSNOTREADY	Remote system is not ready.

92	SOCK_VERNOTSUPPORTED	Current socket version not supported by application.
93	SOCK_NOTINITIALISED	Socket API is not initialized.
101	SOCK_DISCON	Socket has been disconnected.
110	SOCK_FTP_RESTART	A restart marker has been received from the remote host.
120	SOCK_FTP_SYS_DELAY	FTP service ready in *nnn* minutes.
125	SOCK_FTP_CONN_X	FTP data connection already open.
150	SOCK_FTP_FILEOK	FTP File status is okay.
200	SOCK_FTP_OK	FTP command is okay.
202	SOCK_FTP_CMD_IMP1	FTP command is not implemented
210	MAIL_NOCNCT	No mail connection available.
211	SOCK_FTP_SYS_STAT	Current FTP reply is a system status or system help reply.
211	MAIL_BADORIG	Originating email address is invalid.
212	SOCK_FTP_DIR_STAT	Current message is a directory status.
212	MAIL_BADDEST	Destination email address is invalid.
213	SOCK_FTP_FILE_STAT	Current message is an FTP file status.
213	MAIL_BADDOM	Domain name provided to SMTP is invalid.
214	SOCK_FTP_HELP_MSG	Current message is a help message.
214	MAIL_NODATA	Cannot send email data.
215	SOCK_FTP_SYS_NAME	FTP system type.
215	MAIL_NOEND	Cannot end the transmission of email.
216	MAIL_NOQUIT	Unable to end the email session.
217	MAIL_BADCC	CC address(es) are invalid.
220	SOCK_FTP_SVC_READY	FTP service ready for new user.
220	POP_NOCNCT	POP connection not available.
221	SOCK_FTP_SVC_CLOSING	FTP server closing control connection.
221	POP_NOSTAT	POP statistics unavailable.
222	POP_NOLIST	POP email list unavailable.
223	POP_INVUSER	Invalid POP account username.
224	POP_INVPASS	Invalid POP account password.
225	SOCK_FTP_CONN_NOX	No FTP connection.
225	POP_NOOFF	Unable to logoff of POP.
226	SOCK_FTP_CLOSE_CONN	FTP server closing data connection.
226	POP_NODEL	Unable to delete mail.

227	SOCK_FTP_PASSIVE	Passive Mode (h1,h2,h3,h4,p1,p2).
227	POP_NOGET	Unable to get mail.
228	POP_NOUNDEL	Unable to undelete mail.
230	SOCK_FTP_LOGIN	Unable to log into FTP server.
250	SOCK_FTP_FILEACT_OK	Requested file action okay, completed.
257	SOCK_FTP_PATH_CREATE	"PATHNAME" created.
331	SOCK_FTP_PASS	Invalid FTP password.
332	SOCK_FTP_ACNT1	Invalid FTP account.
350	SOCK_FTP_FILE_WAIT	File action pending further information.
400	SOCK_NNTP_SVC_DISCNCT	Service disconnected.
411	SOCK_NNTP_NO_NWSGRP	No such newsgroup.
412	SOCK_NNTP_NO_SLCT_NWSGRP	No newsgroup selected for operation.
420	SOCK_NNTP_NO_ARTICLE	No current article has been selected.
421	SOCK_NNTP_NO_NXT_ARTICLE	No next article available in selected group.
421	SOCK_FTP_SVC_NOT_AVAIL	Service not available.
422	SOCK_NNTP_NO_PRV_ARTICLE	No previous article available in selected group.
423	SOCK_NNTP_NO_ARTICLE_NUM	No such article available in selected group.
425	SOCK_FTP_CONN_CLOSED	Cant open data connection.
426	SOCK_FTP_XFR_ABORT	Connection closed; transfer aborted.
430	SOCK_NNTP_NO_SCH_ARTICLE	No such article in selected group.
435	SOCK_NNTP_ARTICLE_NOTWNT	Article not wanted, do not send to server.
436	SOCK_NNTP_XFR_FAIL	Transfer failed, try again later.
437	SOCK_NNTP_ARTICLE_RJCT	Article rejected, do not resend.
440	SOCK_NNTP_NO_POST	Posting of articles not allowed.
441	SOCK_NNTP_POST_FAIL	Posting of the article has failed.
450	SOCK_FTP_FILE_BUSY	Requested file action not taken.
451	SOCK_FTP_LOCAL_ERROR	Local error in processing.
452	SOCK_FTP_INSUFF_SPC	Insufficient storage space in system.
500	SOCK_NNTP_CMD_SYNTAX	Syntax error, command unrecognized.
500	SOCK_FTP_CMD_SYNTAX	Syntax error, command unrecognized.
501	SOCK_NNTP_ARG_SYNTAX	Syntax error in arguments.
501	SOCK_FTP_ARG_SYNTAX	Syntax error in arguments.
502	SOCK_NNTP_NO_ACCESS	Access is restricted or denied.
502	SOCK_FTP_CMD_IMP2	FTP command not implemented.

503	SOCK_NNTP_FAULT	Program fault, operation not performed.
503	SOCK_FTP_BAD_SEQ	Bad FTP sequence.
504	SOCK_FTP_CMD_IMP3	FTP command not implemented.
530	SOCK_FTP_NOLOGIN	Not logged into remote host.
532	SOCK_FTP_ACNT2	Need account on remote host to store files.
550	SOCK_FTP_FNOT_FOUND	Requested action not taken.
551	SOCK_FTP_PAGE_UNK	Page type unknown.
552	SOCK_FTP_XEED_STOR	Exceeded storage allocation
553	SOCK_FTP_NAME_NOTALL	File name not allowed.
926	SOCK_FTP_INVFILE_HANDLE	Local file is invalid
927	SOCK_FTP_INVFILE	Local file is invalid
1001	SOCK_HOST_NOT_FOUND	Host not found
1002	SOCK_TRY_AGAIN	Not authorized, host not found
1003	SOCK_NO_RECOVERY	Non recoverable error
1004	SOCK_NO_DATA	No data available for request
1010	SOCK_GPH_NOFNAME	Query requires an output file.
1011	SOCK_GPH_NOEXEC	Unable to execute application.
1012	SOCK_NO_SND_DATA	Unable to send data
1013	SOCK_NO_CNCT_DATA	Unable to connect to remote

The Toupin Corporation

An Internet Services Company

A port is doorway through which a connection to a remote Internet host passes. Ports are accessed by their number where each type of service on the Internet utilizes a particular port number. For Gopher, the port number is 70.

An IP Address is much like your own address for your home. Everyone of your friends knows your house by your name where, for instance, a house is the Smiths house. The post office knows that the Smiths house is located at 1122 South Street. On the Internet, all nodes have a name (e.g., toupin.com) and an associated address (e.g., 199.117.41.151). The address, being the IP Address, is used to send information to remote nodes. The address can be resolved for a known host name using the GetHost custom control.

Installation

To install the custom control you should perform the following steps :

Copy the custom control and the help file into a directory of your liking. Normally this directory is the Windows system subdirectory

The control must be registered into the system registry before it can be used by any application. Using the included REGSVR32.EXE application, type the following command line :

REGSRVR32 <*directory*>\ FNAME.OCX

From within your container application, include the custom control and access the methods and members of the control for your custom Internet application.

NOTE : If you move the control you must reregister the control to take into account the new directory.

Registration

Make checks payable to and mail to :

Edward B. Toupin
448 East Arden Circle
Highlands Ranch, CO 80126

Order Form

NAME : _____
COMPANY : _____
ADDRESS : _____
CITY : _____
STATE : _____ ZIP : _____
COUNTRY : _____

PHONE : _____
FAX : _

EMAIL : _____
COMPUSERVE : _____

CONTROL	QTY		UNIT	TOTAL
ARCHIE CLNT v1.00a	_____	$	25.00	_____
CHATTER v1.00a	_____	$	20.00	_____
CONNECT v1.00a	_____	$	55.00	_____
FINGER v2.00a	_____	$	10.00	_____
FTP v2.50a	_____	$	35.00	_____
GOPHER CLNT v1.00a	_____	$	35.00	_____
GETHOST v2.50a	_____	$	10.00	_____
IRC v1.00a	_____	$	40.00	_____
MAIL v2.00a	_____	$	35.00	_____
MIME v1.00a	_____	$	55.00	_____
NEWS v1.00a	_____	$	35.00	_____
RAS v1.00a	_____	$	35.00	_____
SNMP v1.00a	_____	$	250.00	_____
TELNET v1.00a	_____	$	50.00	_____
TIME v2.00a	_____	$	10.00	_____
UUENCODE v1.00a	_____	$	55.00	_____
WAIS v1.00a	_____	$	25.00	_____
WEB CLIENT v1.00a	_____	$	275.00	_____
WEB SERVER v1.00a	_____	$	425.00	_____
WHOIS v1.00a	_____	$	10.00	_____
WSOCK v1.51a	_____	$	35.00	_____
			TOTAL	_____

Feedback

CONTACT

Name :
Company :
Position :
Address :
City : State : Zip :
Country :

Phone :
Fax :
Email :

Name and version of custom control :

Where did you acquire the application ?

Purpose of your Company :

How is this system going to be used :

Type of Computer and Peripherals :

Suggestions for future systems or enhancements to this system :

EXPERIENCE

LEVEL OF INTERNET USER EXPERIENCE : Beg Int Adv

LEVEL OF INTERNET CONNECTIVITY KNOWLEDGE : Beg Int Adv

LEVEL OF INTERNET APPLICATION DEVELOPMENT EXPERIENCE : Beg Int Adv

LEVEL OF CUSTOM CONTROL USER EXPERIENCE : Beg Int Adv

LEVEL OF CUSTOM CONTROL DEVELOPMENT EXPERIENCE : Beg Int Adv

SYSTEM DESCRIPTION

WINDOWS VERSION : Windows NT Windows 95 Windows 3.11 Windows 3.1

32-BIT CONTAINER APPLICATION SUPPORTING VBA OR VB :

INTERNET PROVIDER :

VISUAL C++ 2.0 OR LATER :

MEMORY, HARD DRIVE(S), MODEM (TYPE, BAUD, ETC.), ETC :

DO YOU WANT INFORMATION ON UPDATES EMAILED TO YOU : Y N

DO YOU SUPPORT UUENCODING AND PKZIP 2.X ?

Requirements and Information

The custom control was designed and developed under Windows NT 3.5 as a 32-bit custom control (OCX). To utilize the functionality of the system you will require the following :

Windows NT 3.5 or greater or Windows 95

Windows Sockets v1.1 or compliant socket interface

Connection to the Internet (e.g. SLIP/PPP via Internet provider)

For dial-up services, Remote Access (or equivalent) for communications

A 32-bit container application or development environment

Shareware

This software, hereafter referred to as **the software**, is **NOT** a public domain or free program. It is being distributed as Shareware. The Association of Shareware Professionals (ASP) offers the following definition of Shareware:

> Shareware distribution gives users a chance to try software before buying it. If you try a Shareware program and continue using it, you are expected to register. Individual programs differ on details some request registration while others require it, some specify a maximum trial period. With registration, you get anything from the simple right to continue using the software to an updated program with printed manual.
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Internet Communications Overview

What is TCP/IP?

TCP/IP (Transmission Control Protocol / Internet Protocol) is a suite of protocols used to allow cooperating computers to share resources across a network. In actuality, the more accurate description of the set of protocols is the *Internet protocol suite*. A few of the protocols of TCP/IP (e.g., IP, TCP, and UDP) provide low level functions needed for many applications. These low level functions provide a means of encapsulating data and sending it out onto the network.

Other higher level protocols are used for performing specific tasks such as transferring files between computers, sending mail, or finding out who is logged in on another computer. These high level protocols are known as *application protocols* because they are specific to an application and reside above the lower level TCP/IP network level protocols. The more important of these protocols and TCP/IP services are:

File Transfer The file transfer protocol (FTP) allows a user on any computer to send or retrieve files from another computer. Security is handled by requiring the user to specify a user name and password acceptable on the other computer.

Remote Login The network terminal protocol (TELNET) allows a user to log in to any other computer on the network that supports TELNET. You start a remote session by specifying a computer to connect to thus allowing you to send your keystrokes to the other computer. When you type you are still communicating with your own computer but the TELNET application makes the remote computer look as though it were your local computer.

Electronic Mail Electronic mail allows you to send messages to users on other computers. When you send mail, the mail software expects to be able to open a connection to the addressee's computer in order to send the mail. In many cases, users have an intermediate mail server that accepts mail for users. A user can then log onto the mail server at their leisure and accept their mail from the server.

Even though many people can perform the above operations from a single computer, that computer will occasionally call on the resources of other computers located on the network. This method of resource sharing has led to the *client/server model* of network services. A server is a system that provides specific services to client systems that reside on a network. The following is a list of typical servers available within the framework of TCP/IP on many of todays networks :

File Systems File servers allow computers on the network to be more closely coupled to remote applications than otherwise available through standard FTP. A network file server provides a means of allowing the client computers to view the servers disk as though it were local to the client computer.

Printing Print servers allows you to access printers on other computers as if they were directly attached to yours.

Remote Execution This method of resource sharing allows you to request that a particular program be executed on a different computer on the network. There are two primary types of remote execution : *command basis* and *remote procedure call.* The command based execution allows you to request that a specific command or set of commands execute on a remote computer. Remote procedure calls allow a program to call a subroutine that resides on a remote computer.

Name Servers Name servers provide a means of associating host names to host addresses. In large network installations there are a number of different collections of names that have to be managed including users, names and network addresses for computers, and accounts. Computers requesting access to other computers on a network use the name server protocol used to keep track of host names and addresses on the Internet.

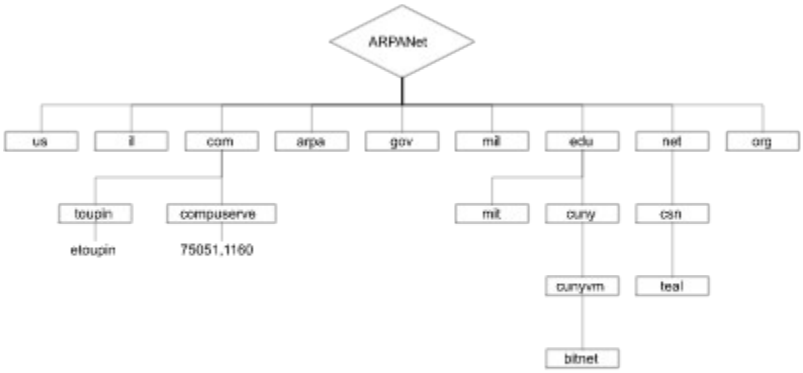
Terminal Servers Terminal servers are generally small computers that use the TELNET protocol and handle incoming calls and accesses from remote TELNET clients.

Network Based Window Systems Network window systems allow applications to use a display on a remote computer as opposed to having to execute high-performance graphics programs on a graphics screen directly attached to the computer. Network window systems allows you to distribute jobs out to remote systems but manage a graphically-based user interface.

What is the Internet?

The Internet is not just one network but is instead a collection of networks including Arpanet, NSFnet, regional networks such as NYsernet, local networks at a number of University and research institutions, and a number of military networks. The term Internet applies to this entire set of networks that constitute the world-wide communications paths available today.

The subset of the available networks that are managed by the Department of Defense is referred to as the Defense Data Network (DDN) which includes research-oriented networks, and specific military networks. All of these networks are connected to each other allowing users to send messages from one network to another quite transparently.

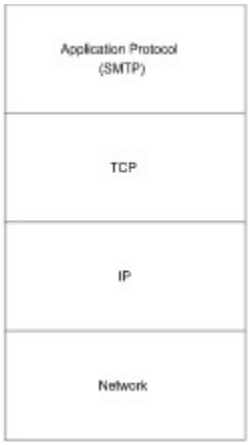


One portion of the Internet -- the ARPANet Gateway

TCP/IP Protocols and Communications

The TCP/IP suite of protocols is known as a *layered* set of protocols. Essentially, a layered set of protocols involves the hierarchical association of functionality for communications between applications on the Internet. To understand what this hierarchy consists of let us take a look at the process of sending email across the Internet.

The first level of the protocol for email is the Simple Mail Transfer Protocol (SMTP). This protocol defines a set of commands used for sending mail from one machine to another. These commands allow the identification of the sender and the recipient as well as the body of the message. This protocol, however, is not all that is required to simply send the information to another node. SMTP assumes that a mechanism exists that allows the SMTP information to be sent reliably between the two computers. Being a standard *application protocol* SMTP merely defines a common set of commands and messages. This protocol resides on top of a communications protocol like TCP and IP.



The basic communications stack

The TCP communications protocol is responsible for guaranteeing reliable transfer of information between the machines. TCP monitors the information that is being sent and retransmits any information that was not received at the other end. TCP also manages the *segmentation* of messages. If messages are too large for a particular packet, or *datagram*, TCP segments the information into several datagrams and makes sure that they all arrive in order and intact.

TCP resides above and calls on the services provided by IP. IP, which provides the basic service of routing datagrams to their destination, allows you to communicate in the protocol specific to the available network. The layered approach allows applications such as mail to call on the services of the layers immediately below.

Routing

TCP/IP assumes that there are a large number of independent networks connected together by gateways allowing users access to resources on any of the networks that make up the Internet. Because of these numerous gateways, datagrams usually pass through several networks before reaching their destination. In order to accomplishing the *routing* through the numerous network, each gateway must know the path to each consecutive network for the ultimate destination. As far as the user is concerned, all they need to know in order to access a remote system is the *IP Address* of the remote system. This address looks like 199.41.151.74 and is actually a 32-bit representation of the remote nodes address, however, it is normally represent with the 4 decimal numbers each representing 8 bits of the address. The address structure can provide you with some information about how to get to the remote system. For example, 199.41 is a network number assigned by a central authority to an organization. This organization uses the following value octet to indicate which of the organizations networks is involved in the communication. 199.41.151 could be the primary network for a research facility of the

organization. The final value allows for up to 254 systems on each network.

As you probably have seen we refer to systems by name rather than by a systems Internet address. When a name is specified the network communications software locates the name in a central database. The database, containing all network names and associated addresses, returns the corresponding Internet address of the computers name.

Communications

TCP/IP is built on a *connectionless* technology where information is transferred as a sequence of *datagrams*. *Datagrams* are a collection of information that is sent as a single message with each datagram being sent through the network individually and independently of the others. Even for those conversations that are established and continue for some time, information from those connections is broken up into datagrams, and those datagrams are treated by the network as completely separate. The protocols involved in the communication will break up the information into separate datagrams and send them to the other end. Once they arrive at the other end they will be put back together into the original message.

One point to note is that while those datagrams are in transit the network is not aware that there is any relation between the intransit datagrams. In certain circumstances it is possible for datagram 10 to arrive before datagram 9. In another circumstance it is also possible that an error will occur on the network thus keeping a datagram from arriving. In this situation that datagram would have to be resent.

The TCP Layer

The top layer of the two layer TCP/IP stack is TCP (Transmission Control Protocol) and is responsible for breaking up messages into datagrams, reassembling them at the other end, resending anything that does not arrive at the remote end of a connection, and reassembling segmented messages. The IP (Internet Protocol) handles all of the routing of individual datagrams.

On a small network, IP is not really utilized to its fullest, however, on the Internet, simply getting a datagram to its destination can be a complex job. A remote connection sometimes requires that a datagram route through several networks and network media. Managing the routes to all of the destinations and handling incompatibilities among different transport media turns out to be a complex job. Note that the interface between TCP and IP is fairly simple where TCP simply hands IP a datagram with a destination address associated with it.

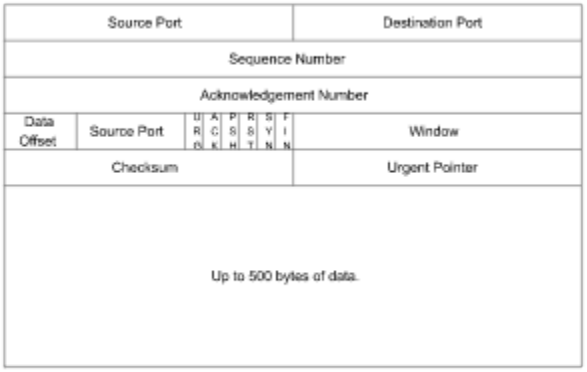
If you have multiple connections to a single host, TCP must has to know which connection is associated with which inbound datagram. The task of managing datagram-connection associations is known as *demultiplexing*. The information required to perform the demultiplexing is located in a series of *headers* which are simply a few extra bytes preceding the data of a datagram.

Lets say you want to send a file to another computer. This file starts out as a stream of bytes that is submitted to TCP for submission onto the network. In order to properly handle the data on the network, TCP segments the stream into smaller pieces of information, or datagrams.

On the front of each of the datagrams TCP attaches a header containing at least 20 bytes including a source and destination *port number* and a *sequence number.* The port numbers are used to keep track of different conversations. Suppose 3 different people are transferring files. Your TCP might allocate port numbers 1000, 1001, and 1002 to these transfers. When you are sending a datagram, this becomes the *source port* number since you are the source of the datagram while TCP on the receiving computer has assigned a port number of its own for the conversation. The local TCP has to know the port number used by the other end as well to place it into the *destination port* field.

Every datagram has a unique sequence number that is used so that the other end can make sure that the datagrams are received in the correct order and that no datagrams are missed. The computation for determining the sequence number is not based on the numeric order of the datagram but on the number of bytes being sent for the entire stream of data. For instance, if there are 50 octets of data in each datagram, the first datagram might be numbered 0, the second 50, the next 100, the next 150, etc.

Within the header of each datagram is a calculated checksum value. This is a numeric representation of the data contained in the datagram and is computed by adding up the values of all bytes in the datagram. The receiving end computes the checksum again and, if the two computed and transmitted checksums disagree, an error occurred in the transmission and that datagram is discarded.



With regards to other fields of the header, these are involved with managing the connection between the remote and local nodes. For instance, the *acknowledgment number* is used to inform the remote TCP to respond with an acknowledgment of receipt of the specific datagram. When the remote TCP responds with an acknowledgment of receipt that field contains a numeric response value. For instance, sending a packet with an acknowledgment number of 500 indicates that you have received all the data up to byte number 500. If the sender does not receive an acknowledgment within a reasonable amount of time, the data is sent again to the recipient.

The *window* field indicates the number of bytes of data a machine is ready to accept and is used to control how much data can be in transit at any one time. It is not efficient to wait for each datagram to be acknowledged before sending the next one nor can you just send data otherwise a high-speed machine might overrun the capacity of a slower machine. As the recipient receives data, the value in *window* decreases until it reaches 0. At 0 the sender has to stop sending until the recipient processes the data it currently has received. As more processing space becomes available the window value increases indicating that it is ready to accept additional data.

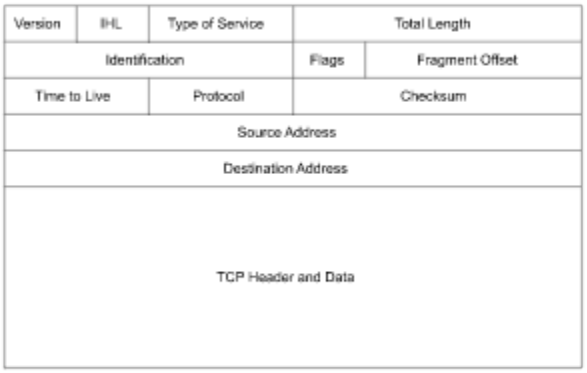
The *urgent* field allows one end to tell the other to skip ahead in its processing to a particular byte. This type of functionality is often useful in handling asynchronous events such as when you type a control character or other command that interrupts output.

The IP Layer

Once TCP has completed processing of the datagrams, it submits each datagram to the IP layer. With each of these datagrams is the IP address of the computer for which the datagram is destined. The IP layer is not concerned about the contents of the datagram but is instead concerned about determining the best route for the datagram to reach the remote computer.

To properly route the datagram and allow intermediate systems to forward the datagram, IP adds its own header to the datagram. This header contains the source and destination IP address, the *protocol identifier*, and another checksum. The source address is simply the address of the originating machine while the destination address is the address of the recipient machine. The informs the IP layer at the recipient to send the datagram to the appropriate protocol handler. Even though much of the common IP traffic uses TCP the stack allows other protocols to use IP so you must inform IP of the destination protocol handler.

As with TCP, the checksum allows IP to determine if the header was damaged during it travel through the network. IP maintains its own checksum in order to verify that its header did not get damaged in transit.



IP Header and Data

Some of the other fields of the header contain information and flags to keep track of the datagram if it should need to be split up. In many cases, this additional segmentation can occur if the size of a datagram exceeds the maximum size allowable on a given network.

The *time to live* field is a number that is decremented whenever the datagram passes through a network system. When this values is decremented down to 0 the datagram is discarded. This field has been implemented so that the datagram does not continue to travel aimlessly through a system should a loop condition occur somewhere in the network.

The Network Layer

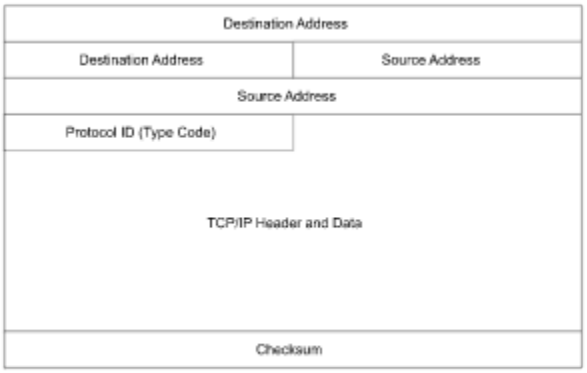
Lets examine the bottom layer of the communications stack, the *network layer*, and how information travels across one of the more common network architectures -- the Ethernet. This layer is important in that, regardless of the network medium, it too maintains a header that is applied to a TCP/IP datagram above and beyond the TCP and IP headers.

In addition to the IP addresses discussed in the IP layer we also have to contend with Ethernet addresses. Ethernet addresses are maintained by a 48 bit (6 byte) address that is intended to keep multiple machines from obtaining the same address across the board. Ethernet equipment vendors have to register with a central address management group to make sure that the numbers they assign do not overlap with any other manufacturer.

The Ethernet uses a *multiple access*, or shared, medium for communications in that every machine on a local network sees every packet on that local network. As with TCP/IP a header is added so that the Ethernet frame is accepted by the correct destination node. The Ethernet packet contains a 14-byte header that includes the source and destination Ethernet address, and a protocol identifier. The machines on the network only accept those packets with the appropriate Ethernet address in the destination field. There is no direct correlation between the Ethernet address and the IP address so there exists a table on the local network that relates Ethernet addresses with IP addresses.

The protocol identifier allows for several different protocol families to be used on the same network including TCP/IP, DECnet, etc. simultaneously. Each of the different types of protocols maintain a different protocol identifier so that the Ethernet stack can properly route the Ethernet frame to the proper protocol stack.

The Ethernet physical layer drivers compute a checksum of the entire packet, just as the TCP and IP layers calculate their checksums. In the case of Ethernet checksums, the checksum is appended to the end of the Ethernet frame. If the computed and original checksums do not agree at the receiving end, the packet is merely discarded and no request for a resend is made. This request for resend is the responsibility of the higher level protocols.

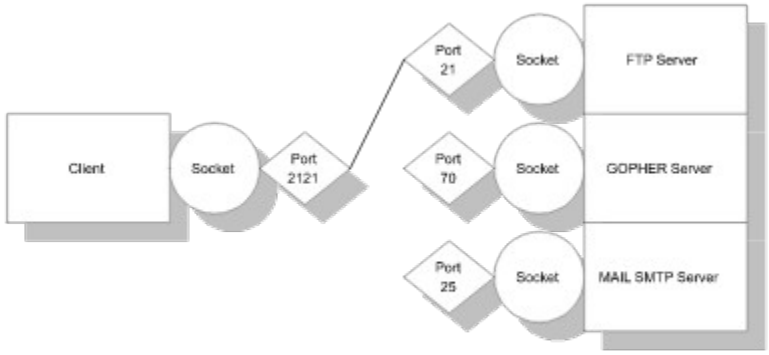


Ethernet Header and Data

The Application Layer

Over a network, there are methods available that allow you to open a connection to a specified computer, log into it, request files or resources, and control the resources or the transmission of a file. All of the aforementioned operations are handled by *application protocols*. These application protocols reside above and utilize the resources of TCP/IP.

Lets assume that you want to send a file to a machine whose IP address is 199.117.41.151. In order to send the file you must not only connect to the node at the IP address but you must also connect to the FTP (File Transfer Protocol) server on that node. Network applications on network nodes perform specialized tasks so connecting to a nodes address is not enough to handle all of the functionality required on the network. In order to specify that you wish to communicate with the FTP server you must connect to the specific *port* for the server. This port is the port that TCP uses in its header to keep track of individual conversations. Specific port numbers are assigned to the applications, or servers, that wait for requests from client applications. If you want to send a file, you will open a port with a random number on your end which connects to port number 21 on the remote machine -- the official port number for the FTP server.



Clients and Servers connect over a common service port.

Once we have established this connection using TCP and IP we can continue in establishing communications between the two applications. This next step of communications is in establishing an agreement on what set of commands the application will understand, and the format in which they are to be sent. For example, the mail protocol operates as follows :

A mail application establishes a connection with a mail server.

The mail application sends the host machine's name, the sender of the message, and the recipients of the message.

The mail application sends a command to initiate the message.

The mail server starts accepting the message.

The mail application sends the text of the message.

The mail application sends and end-of-message character.

The mail application and the mail server end the communications and close the connection.

The file transfer protocol, on the other hand, involves two separate connections : one for data and one for commands. Communications begins just like mail, however, once the command to transfer data is sent, a second connection is opened for the data itself. It is possible to send data on the same connection, however, file transfers

often take a long period of time and the originators of FTP decided it was best to allow users to issue commands while the transfer is going on (e.g., abort transfer, etc.).

Other Protocols

Recall that TCP is responsible for taking a message stream and segmenting it into datagrams for transmission on the network. In some situations however you may need to send a message that fits wholly into one datagram. One such example is that of a name lookup where an IP address is located for a given host name. In this situation a user attempts to make a connection to another system by specifying the system by name. The users system has to translate the name into an IP address before the connection can be transmitted. The user's system will send a query to one of the systems that maintains the name/address database and then wait for a response. This response will consist of one datagram therefore the full utilization of TCP would be overkill. In this situation the application could utilize UDP (User Datagram Protocol). UDP is designed specifically for situations where sequencing and reassembly of datagrams is not necessary. When sending data, UDP prepends a header to the data and submits it to the IP layer. Unlike TCP, UDP does not segment data into multiple datagrams, nor does it track what it has sent in case of a resend. The one similarity between UDP and TCP is that it does provide for port number assignment information for proper routing.

Another alternative protocol is ICMP (Internet Control Message Protocol) which is primarily used for error messages, and other messages intended for the TCP/IP software itself. ICMP is used for error messages sent back from remote hosts or intermediate systems (e.g., Host Unreachable, Network Down, etc.) and can also be used to find out information about the network. ICMP is similar to UDP in that it manages information in a single datagram however it is even simpler than UDP since it does not rely on port numbers nor contain port numbers in its header. Since all ICMP messages are interpreted by the network software itself, no port numbers are needed to route messages to any user application.

The Domain Name System

Users generally prefer to refer to computers on a network by name than by address. TCP/IP network software requires a 32-bit Internet address in order to establish a connection between to nodes or send a datagram to a remote node. To associate the user required node names and the node addresses these exists a database that allows network software to look up a host name and find the corresponding address.

For a small network this operation is simple since each system on the network would maintain a file containing all other systems names and addresses on the network. For the Internet, things are not that simple so to remedy this situation these name / address files are replaced by *name servers* that manage host names and their corresponding addresses. The host names stored on the name servers follow a hierarchical structure such as PEGASUS.TOUPIN.COM. In order to find its Internet address, you might potentially have to consult 3 different servers. First, you would ask a central, *root*, server of the location of the COM server. COM is a server that keeps track of for-profit organizations on the Internet. The root server would give you the names and Internet addresses of several servers for COM.

You would then ask COM for the server for TOUPIN. The COM server would give you names and Internet addresses of several servers for TOUPIN. Finally you would ask TOUPIN where the server for PEGASUS is located. The final result would be the Internet address for PEGASUS.TOUPIN.COM. Each of these levels is referred to as a *domain* while the entire name, PEGASUS.TOUPIN.COM , is called a *domain name*.

A few things to note. First, the root name servers also happen to be the name servers for the top-level domains such as COM, EDU, ORG, etc. therefore a single query to a root server will get you to TOUPIN. Second, *address resolution* software caches prior look-ups therefore once you look up a name at PEGASUS.TOUPIN.COM the software remembers where to find servers for PEGASUS.TOUPIN.COM, TOUPIN.COM, and COM.

Routing

The IP layer is responsible for the task of passing datagrams to a destination indicated by the destination address. This task of determining the best path to get a datagram to its destination is referred to as *routing*.

Routing is based entirely upon the network number of the destination address. For each computer there exists a table of network numbers. For each network number there exists a gateway that is used to access that network. The gateway does not have to be physically connected to the network, however, it is the best path to follow in order to access the desired network for the destination address.

Before sending a datagram, the IP of the originating computer checks to see if the destination address is on the computers own local network. If on the local network, the datagram can be sent directly to the destination address. If the destination node is not on the local network the system attempts to locate and an entry for the network on which the destination address is located. The IP submits the datagram on the network to the gateway listed in the entry associated with the destination address entry.

For the gateways along the path each gateway determines the next path over which the datagram should pass. This operation occurs on the Internet until a gateway to the destination nodes network is found or until the *time to live* field of the frame reaches 0.

Datagrams

TCP/IP was originally designed for use with many different networks, however, not all network vendors have agreed to a maximum packet size for their particular network implementations. Ethernet packets can be 1500 bytes and Arpanet packets have a maximum of around 1000 bytes while some of the faster network allow larger packet sizes.

Settling on the smallest possible packet size seems legitimate, however, this would introduce performance problems for end to end communications. To pass over many different networks we need to reach some sort of compromise. The transfer of large pieces of information is quite efficient with large packets, however, since the maximum packet sizes vary, we cannot establish a standard size. To manage these variable packet sizes TCP *negotiates* datagram size when a TCP connection first opens with a remote computer.

When negotiating packet sizes, TCP segments datagrams in order to accommodate the network whose maximum packet size is the smallest. The IP header contains fields indicating the a datagram has been split and enough information to let the pieces be put back together. If one gateway connects an Ethernet to the Arpanet, the Ethernet based TCP layer must be prepared to take 1500-byte Ethernet packets and segment them into packets that will fit onto the Arpanet. The destination node must then *reassemble* the segmented packets into the original message.

Support

Support for the Connectivity Custom Controls can be obtained by emailing the problem report below to Edward B. Toupin at :

Internet	:	etoupin@toupin.com
Compuserve	:	75051,1160

An online problem report can be filled out at :

WWW	:	http://www.toupin.com/~etoupin/cccprob.html
		http://www.toupin.com/~etoupin/welcome.html

Email is checked regularly so a response will be emailed as soon as the mail is received and examined. If you are a registered user, the problem will be investigated and a problem resolution will be emailed back to you. If the problem exists with the custom control a new custom control will be emailed to you otherwise an explanation on how to remedy the problem will be sent.

Problem Report

Name :

Company :

Area Code & Phone :

CompuServe ID :

Internet Address :

Problem Title :

Product and Version :

Operating System:

32bit Container App :

Network type :

Network protocol : version :

Network cabling :

LAN or WAN :

Modem : baud :

Service Provider :

What type of application were you developing :

How was the control being used :

Detailed problem description :

Steps to reproduce the problem (please explain step by step):