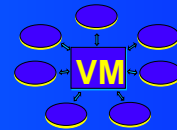


VM TCP/IP Update

2000 VM/VSE Technical Conference
Session M11

Romney White
VM Development
Romney@vnet.ibm.com
USIB64SN at IBMAIL
607-755-8276



Agenda

- Introduction
- TCP/IP Overview
- Product Strategy and Positioning
- Level 310 Service
- Level 320 Enhancements
- Related Product Enhancements
- Futures
- Summary

TCP/IP Overview

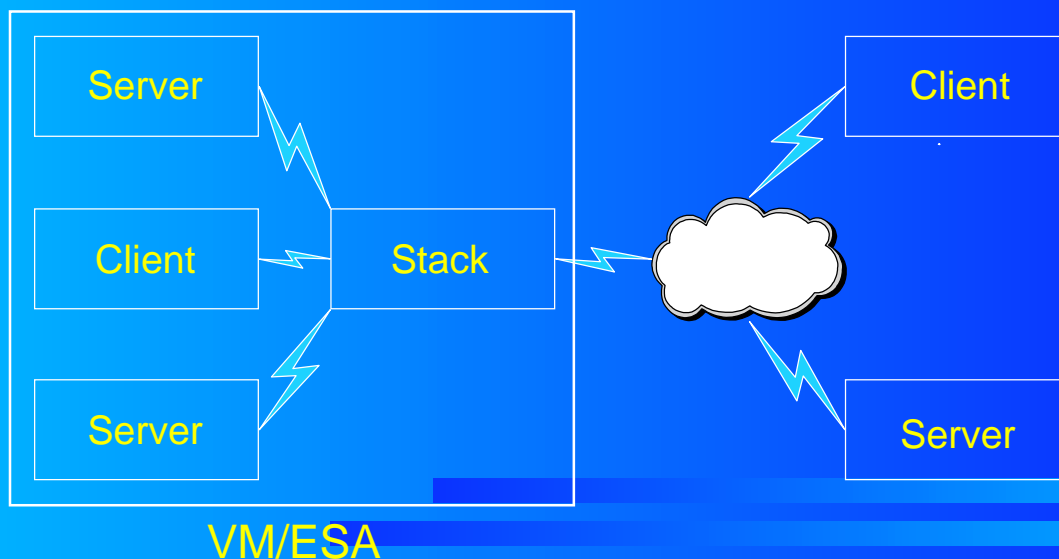
TCP/IP Overview

- Multi-layered communication architecture
 - ▶ Link layer: Ethernet, Token Ring, FDDI, ATM, SNA, ...
 - ▶ IP layer:
packet={sender,receiver,protocol,checksum,data}
 - ▶ TCP layer: connection-oriented, reliable
 - ▶ UDP layer: connectionless, unreliable
 - ▶ Sockets: a way to communicate via TCP, UDP, or IP
 - ▶ Applications: e-mail, file transfer, network station support, ...

TCP/IP Overview (continued)

- Inter-operation across many platforms
 - ▶ Standards-based
 - ▶ Foundation of the Internet
- Client/server orientation
 - ▶ Hence, a natural for VM
 - ▶ Typically, higher level protocols built on TCP or UDP
 - ▶ Hierarchical (one man's client is another man's server)

TCP/IP Overview (continued)



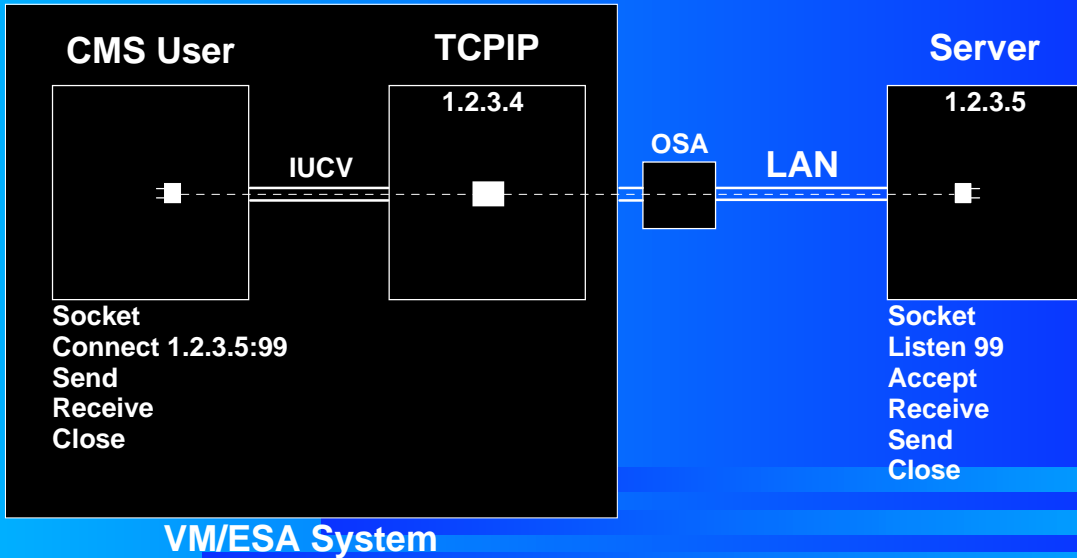
TCP/IP Overview (*continued*)

- In VM, TCP/IP is implemented as follows:
 - ▶ The stack machine provides
 - link, IP, TCP, and UDP layers
 - related protocols (ARP, ICMP)
 - Telnet server
 - a sockets interface via IUCV
 - a non-standard interface via VMCF

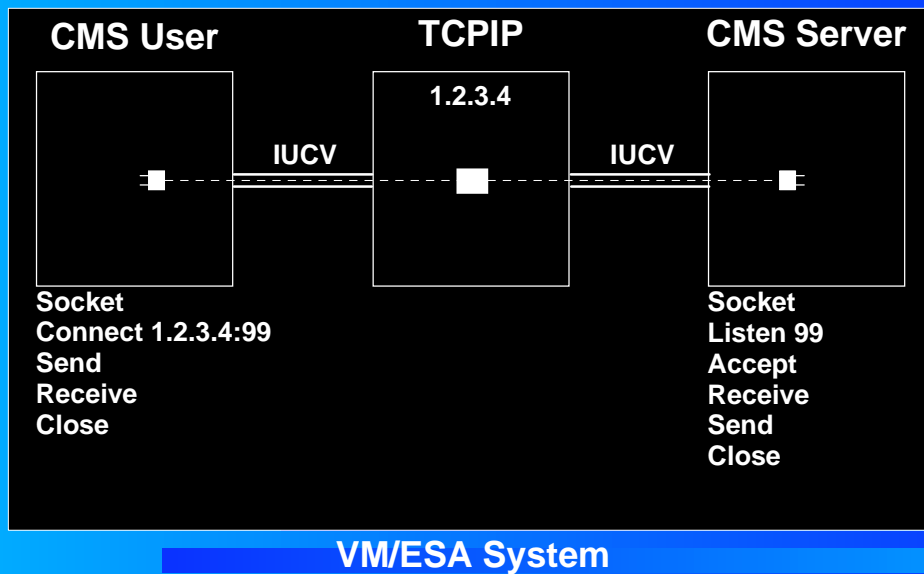
TCP/IP Overview (*continued*)

- ▶ Service machines run application servers (*daemons*)
 - FTP, SMTP, DNS, PORTMAP, NFS, ...
 - listen on one or more ports (TCP or UDP)
 - implement higher-level protocols
 - some provide services to local users as well
- ▶ Individual users run client programs
 - PING, FTP, TELNET, ...

TCP/IP Overview (continued)



TCP/IP Overview (continued)



TCP/IP Overview (*continued*)

- With higher-level protocols such as SMTP and FTP
 - ▶ The devil is in the details
 - For the most part, the protocols are simple
 - Often, their implications, especially for a server, are not
- RXTCP makes much of TCP/IP accessible to a VMer who is a relative TCP/IP novice

TCP/IP Overview (*continued*)

- VMers have a leg up anyway, because they are familiar with real client/server environments
- However...
 - ▶ There is a lot more to TCP/IP than these few foils show
 - ▶ See GG24-3376, *TCP/IP Tutorial and Technical Overview*, for a comprehensive description
 - ▶ Look for SG24-5459, *TCP/IP Solutions For VM/ESA*, for a more VM-oriented description

VM TCP/IP Strategy and Positioning

VM TCP/IP Strategy and Positioning

- VM TCP/IP mission in Endicott
- TCP/IP Version 2 Release 4 (12/96)
 - ▶ Modest changes on a best-effort basis
- TCP/IP Level 310 for VM/ESA V2R3 (03/98)
 - ▶ More substantial and formal effort
 - ▶ Priced feature rather than separate product
- TCP/IP Level 320 for VM/ESA V2R4 (07/99)
 - ▶ Continue the Level 310 approach
 - ▶ More emphasis on enhancement

VM TCP/IP Strategy and Positioning (*continued*)

- Commitment to ongoing development
 - ▶ Where many customers are or are moving
 - Vast majority of VM/ESA 2.3.0 customers ordered TCP/IP feature
 - ▶ Balance of performance, infrastructure, functional, installation, and service enhancements

TCP/IP Level 310 Service

New Function Since FL 310

- SMTP spamming controls
- PCNFSD support
- EURO enablement
- Packet trace

SMTP Spamming Controls

- PQ05135 - IP address in "Received:" lines
- PQ06018 - Report IP address/name mismatch
- PQ04324 - New configuration statements
 - ▶ VerifyClient - Built-in or exit-driven verification
 - ▶ ForwardMail - Exit-driven mail forwarding control
 - ▶ AllowSourceRoutes - Control source routing
 - ▶ SMTPCmds - Protocol command exits

PCNFSD Support

- APAR PQ16301
- Facilitates authentication of PC NFS clients
 - ▶ Client provides VM user identifier and password
 - ▶ PCNFSD returns UID/GID to enable file access

EURO Enablement

- APAR PQ17871
- New EU currency (and associated symbol) introduced January 1, 1999
- Code point supported by LPR, LPD, FTP, SMTP, and NFS in VM TCP/IP
- Adds user-controlled translation table selection

Packet Trace

- APAR PQ15132
- TRACE/MORETRACE PACKET
- Shows packet contents
- Selective by IP address

Level 320 Enhancements

Level 320 Enhancements

- Function
- Performance
- Infrastructure
- Installation and Service

Functional Enhancements

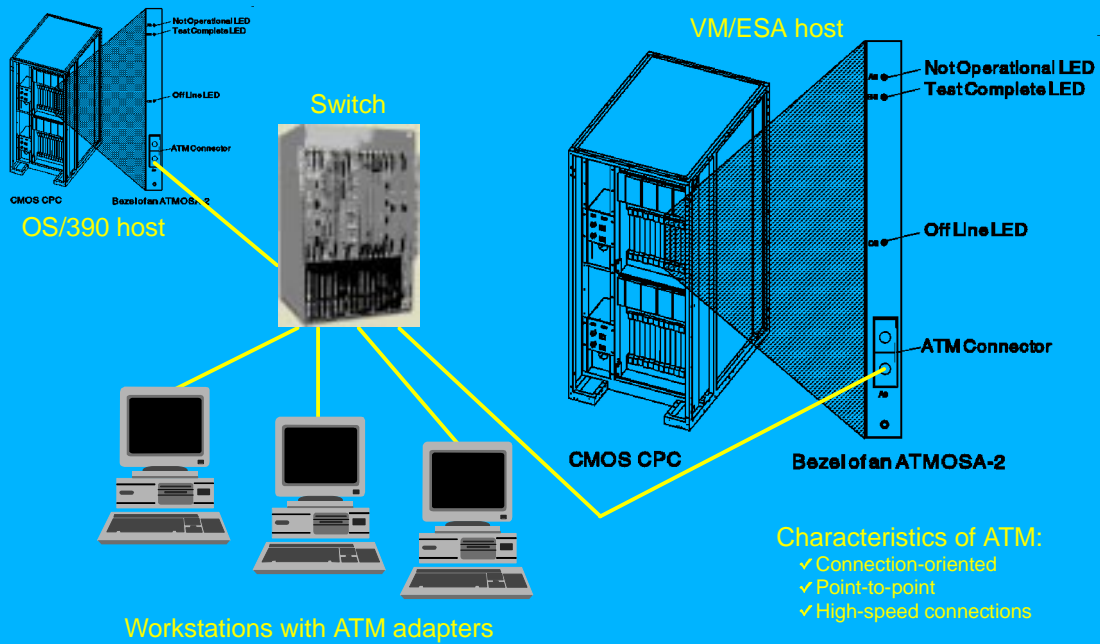
Functional Enhancements

- Native ATM support
- RouteD enhancements
- SMTP protocol upgrade
- FTP extensions
- Unattended File Transfer (UFT) completion
- NFS enhancements
- "LOGONBY" support
- OBEYFILE target selection
- Resolver improvements
- Telnet Client firewall support

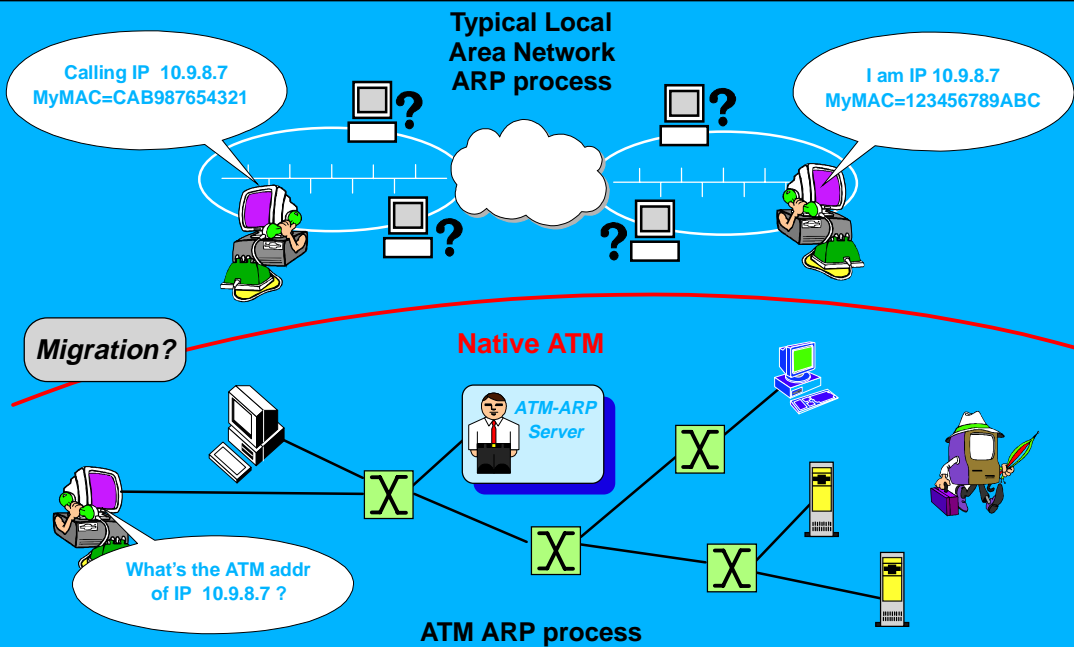
Function: Native ATM Support

- Classical IP over ATM (RFC 2225)
- Supported via Open Systems Adapter (OSA-2) configured for High-Performance Data Transfer (HPDT)
- Requires external ATMARP server for dynamic address resolution
- Supports best-effort Private and Switched Virtual Circuits
- Allows logical IP subnets

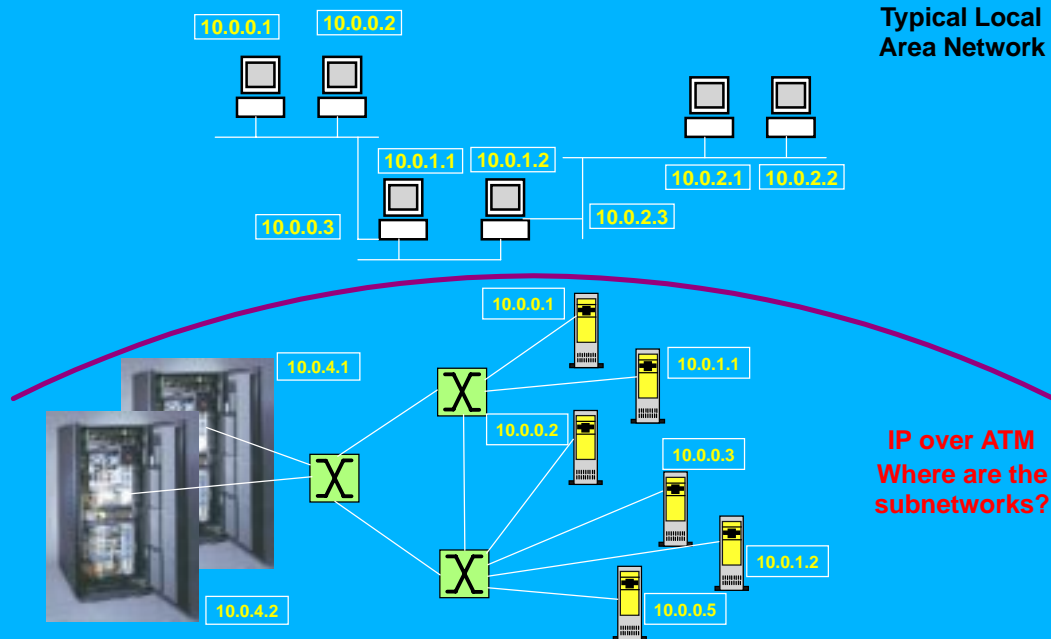
ATM Network



ATM Address Resolution



ATM Logical IP Subnets



Function: Routed Enhancements

- Major dynamic routing upgrade
 - ▶ RIP Version 2
 - ▶ Virtual IP Addressing (VIPA)
 - ▶ Variable subnetting
 - ▶ Supernetting
 - ▶ Improved configuration support
 - ▶ Enhanced problem determination facilities
- SMSG support

Function: SMTP Protocol Upgrade

- SMTP Service Extensions (RFC 1869)
 - ▶ Provides foundation for other extensions
- Message Size Declaration (RFC 1870)
 - ▶ Send/receive message size information
 - ▶ Determine whether to accept a priori
- 8-bit MIME Transport (RFC 1652)
 - ▶ Allows transport of unencoded binary data

Function: FTP Extensions

- SMSG support
 - ▶ Improved server control
 - ▶ Dynamic trace
- FTP welcome banner
 - ▶ Server identification
 - ▶ FTP BANNER displayed if it exists
- User exits
 - ▶ Audit
 - ▶ Command
 - ▶ CD

Function: FTP Extensions (continued)

- FTP to reader
 - ▶ CD, PUT, DELETE, LIST
 - ▶ Sends file in NETDATA format
- Authentication improvements

Function: UFT Completion

- Synchronous UFT client shipped with FL 310
- RSCS UFT server
 - ▶ Receives files via UFT from other systems
- RSCS UFT client
 - ▶ Sends files asynchronously via UFT to other systems

Function: NFS Enhancements

- NFS Version 3 (RFC 1813)
 - ▶ Reduced call frequency
 - ▶ Unsafe (asynchronous) writes
 - ▶ Larger files and read/write sizes
- TCP transport
- Settable read/write sizes, concurrent client limits, mount export restrictions, dump
- Dynamic reconfiguration
- Authentication improvements

Function: "LOGONBY" Support

- Improved authentication for minidisk access
- Originated with comment from customer
 - ▶ User with LOGONBY support needs base user password for FTP access
 - ▶ In fact, problem was more general
 - NFS, as well as FTP
 - Passwords required in non-ESM environment
- New CP and CMS (CSL) interfaces
 - ▶ FTP and NFS authenticate the same way
 - ▶ Logon access to machine => access to disks

Function: "LOGONBY" Support (continued)

- Gain access to target user's minidisks by supplying
 - ▶ Target userid, logon password
 - ▶ Target userid, agent userid, agent password
- FTPSERVE and VMNFS require DIAG88 User Directory option

Function: OBEYFILE Target Selection

- OBEYFILE used TCPIPUSERID setting in TCPIP DATA to determine target stack
- New TCP option allows target to be designated on command line

Function: Resolver Improvement

- New DomainSearch statement
 - ▶ Identifies additional domain to be searched for name resolution
 - ▶ Multiple statements allowed
 - ▶ DomainOrigin specifies local domain name
- New DomainLookup statement
 - ▶ Determines if resolution uses table, DNS, both, or neither
 - ▶ Sets order of use if both selected

Function: Telnet Client Firewall Support

- Proxy servers increasingly common
 - ▶ Authenticate users attempting external access
 - ▶ Restrictions by port (application)
- Current VM TCP/IP Telnet Client can navigate firewall
 - ▶ Restricted to linemode access
 - ▶ Inconvenient for TN3270 services (e.g., IBM Information Network)

Function: Telnet Client Firewall Support (*continued*)

- Client upgraded to allow renegotiation
 - ▶ Telnet to firewall in linemode
 - ▶ Conduct authentication dialog
 - ▶ Connect to external Telnet server
 - ▶ Negotiate TN3270 connection

Performance Improvements

Performance Improvements

- Header prediction
- Monitor data extensions
- MP enablement
- Increase maximum large envelope size

Performance: Header Prediction

- TCP designed for reliability
 - ▶ Packets out of order
 - ▶ Dropped packets
 - ▶ Duplicate packets
- Much of the time, packets are
 - ▶ In order
 - ▶ Not dropped
 - ▶ Not duplicated
- Header prediction takes advantage of this to optimize code paths

Performance: Monitor Data Extensions

- Additional monitor data in existing records
- For example:
 - ▶ Additional Management Information Base values
 - ▶ Header prediction information
 - ▶ Storage pool record when pools expand
- Session 9220: VM/ESA Performance Update, Tuesday, 4:30 pm

Performance: MP Enablement

- Thorough revision of MP-exposed programming techniques
- Setting the stage for an MP-enabled stack

Performance: Increase Maximum Large Envelope Size

- Large envelope size determines size of largest datagram that can be sent or received
- Previous limit was 32K bytes
- Increased to 64K-1 bytes
- Available as corrective service for older levels
- May improve throughput in some cases
 - ▶ e.g., local connections

Infrastructure Extensions

Infrastructure Extensions

- Repel certain Denial of Service attacks
- Reduce CTC "nagging"
- Increase size of 8K envelopes
- More timely server restart

Installation and Service Enhancements

Installation and Service Enhancements

- Customization improvements
- Default to TIMESTAMP PREFIX
- Selective trace additions
- Publications

Installation: Customization Improvements

- Dynamic pool sizes
 - ▶ Buffer pools grow based on demand
 - ▶ xxxPOOLSIZE statements set *initial* sizes
 - ▶ More graceful handling of low storage conditions
- AssortedParms allowed in obey file
- InternalClientParms allowed in obey file
 - ▶ Except ConnectExit, Tn3270eExit, Transform, and Port (which are ignored)
- Specify sizes in kilobytes (e.g., **16K** instead of **16384**)

Service: Selective Trace Additions

- Selective trace added in FL 310
 - ▶ TraceOnly
 - userid
 - IP address
 - device name
 - ▶ EndTraceOnly
- Selectivity honored in more situations

Installation: Publications

- Extensive review of *Planning and Customization Guide*
- Significant effort on other books
- Please send us
 - ▶ Reader's Comment Forms
 - ▶ Marked-up pages
 - ▶ Suggestions for improvement

Related Product Enhancements

Related Product Enhancements

- JAVA and NetRexx
- Diagnose X'88'
- CP TERMINAL TIMESTAMP
- ADSM Version 3
- OSA/SF extensions for ATM native mode
- DB2 Server Version 6 Release 1

Between-Release Enhancements

Between-Release Enhancements

- IMAP server(Session M43: An IMAP Server For VM/ESA)
- Miscellaneous protocols server
 - ▶ Echo (RFC 862)
 - ▶ Discard (RFC 863)
 - ▶ Character Generator (RFC 864)
 - ▶ Quote of the Day (RFC 865)
 - ▶ Active Users (RFC 866)
 - ▶ Daytime (RFC 867)
 - ▶ Time (RFC 868)
 - ▶ Identification (RFC 1413)

Between-Release Enhancements (continued)

- PQ34318 - CTC Protocol limitation removal
 - ▶ Exposed by Linux for S/390 CTC driver
- PQ37002 - Path MTU Discovery enablement
 - ▶ Exposed by Linux for S/390 TCP/IP stack
- PQ37902 - Support Proxy ARP
 - ▶ Exposed by Linux for S/390 configuration questions and problems

Futures

Futures

- Security enhancements
- Routing extensions
- Improve FTP support for Web Browsers
- Socket library convergence
- IP Multicast
- NFS client
- IP filtering
- OSA Direct Express support
- ...

Summary

Summary

- TCP/IP for VM is alive and well
- Level 310 delivered major advances
- Level 320 continues the trend
- We still have more to do
 - ▶ Anticipate where most VM TCP/IP customers are going
 - ▶ Your requirements are important to us

Reference Information

In person:

Romney@vnet.ibm.com
607-755-8276

On the Web:

<http://www.ibm.com/vm/related/tcpip/>
<http://www.rfc-editor.org/rfc.html>
<http://www.redbooks.ibm.com/>

Via mailing lists:

IBMTCP-L@VM.MARIST.EDU
VMESA-L@UAFSYSB.UARK.EDU

On TalkLink:

TCPIP CFORUM