

Network Fundamentals

Presented by Dave Fuhrmann
Prism Network Solutions

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Network Terminology

- Internet Protocols
- Often referred to as TCP/IP Protocol Suite, but involves many other protocols
- Protocols = Rules that enable exchange of information in an orderly, error-free manner
- Layers = specifically defined areas of network communication
- ISO/OSI 7-Layer Reference Model

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OSI 7-Layer Model

7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical

TCP-IP Suite works within layers 2-4

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Physical Layer (1)

- Physical media
 - Cables – UTP, fiber optic, coaxial
 - Wireless – Lasers, microwave, radio
- Send and receive bits

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e3000 Cabling

- UTP for 10BaseT, 100BaseT, Token-Ring
- Thinlan coax with BNC connector (10Base2)
- Thicklan coax with AUI port (10Base5)
- Fiber for FDDI
- Fiber or UTP for Gigabit (N-Class)

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Data Link Layer (2)

- Provides node-to-node communication on a single local network
- Address mechanism for correct delivery of data to nodes (MAC address – media access control)
- Translates messages from upper layer into bits for physical layer
- Network device drivers
- Interface Cards
- Ethernet, 802.3, 802.5 (Token Ring), SLIP, PPP
- Bridging and Switching

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e3000 Interfaces

Layer 2 - Network Interface Types

- LAN (Ethernet and 802.3) – built into MIO card on 9x7, 9x8, 9x9 models
- Token Ring
- 100Base-T
- FDDI
- Others (100VG-AnyLAN, Point-to-Point, X.25, NS over SNA, Gateway half)

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Network Layer (3)

- Allows inter-network communication
- ARP and RARP – mapping network address to physical (MAC) address
- IP
- ICMP
- Routing and Layer-3 Switching

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Transport Layer (4)

- Transport layer divides messages into small fragments (packets) to fit into lower layer protocols
- Packets are reassembled at target based upon message sequence number
- TCP
- UDP

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e3000 Protocols

Layers 3 and 4

- IP
- TCP
- UDP
- PXP

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e3000 Network Applications

- FTP
- Telnet
- Web Server (Apache)
- Samba

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e3000 Network Functions

- DTC – Async device communications (terminals, PCs, modems, printers)
- NS/VT & Telnet – network logon sessions
- 3000 to 3000 communications (NS)
- Network printing
- File Transfer (FTP, EDI, XML)

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Network Design Considerations

- Network interfaces to be used
- Subnetworks
- Internetworks
- Address resolution methods
 - Domain names
 - Probe
 - Address Resolution Protocol (ARP)
- Network Directory

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Interface Priorities

Network Interface Priority Order

- Loopback
- 100VG-AnyLAN
- 100Base-T
- FDDI
- LAN (Ethernet and 802.3)
- Token Ring
- X.25
- Gateway half
- Point-to-Point

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Network Addresses and Subnets

- Will IP addressing be used?
- Will there be network subnets?
- Are routers used to connect to remote network nodes?
- Will the 3000 be connected to a hub, switch, router, etc?
- Is the port switched, or on a VLAN?
- You must work with network administrators for network configuration and setup

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Address Resolution

- Domain Name Services (DNS) – resolves domain names to IP numbers
- Network Directory (NSDIR) – contains info about other nodes in network
- HP Probe – proprietary HP protocol that sends a multicast request over 802.3 networks
- Address Resolution Protocol (ARP) – resolves IP address to station address over Ethernet networks

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Configuring the Network

- Plan your network
- Configure the transport and link with NMMGR (modifies NMCONFIG.PUB.SYS)
- Add nodes to Network Directory
- Validate the network transport
- Start the network links (NETCONTROL)
- Start the network services (NSCONTROL)

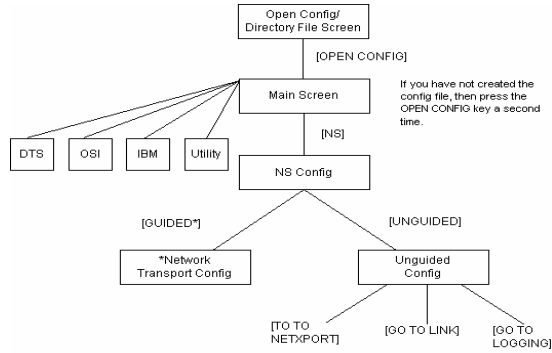
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NMMGR

- Node Management Configuration Manager
- Guided Config – use to establish initial network configuration
- Unguided Config – Random (manual) access to NMMGR screens – use to modify settings

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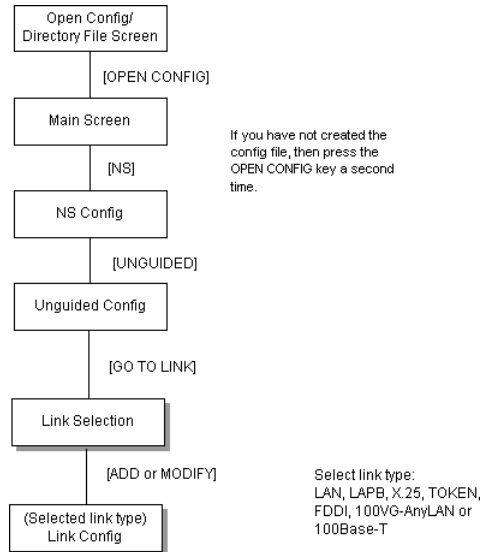
NMMGR



*For information specific to the Guided Configuration screens, refer to the HP 3000IX Network Planning and Configuration Guide.

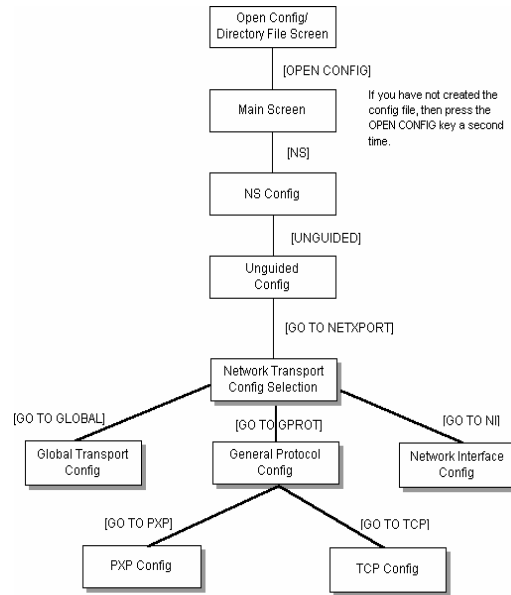
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Link



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Transport



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NMMGR

- Let's look at some of the screens

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MPE Network Commands

- LINKCONTROL - Provides link information, or activates or deactivates link level tracing
- NETCONTROL - Initiates, terminates, and controls the operation of the network transport
- NSCONTROL - Initiates, terminates and controls the operation of the Network Services

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LINKCONTROL

- LINKCONTROL STATUS - Requests status information about the link
- LINKCONTROL TRACE - Activates or deactivates link level tracing

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NETCONTROL

- NETCONTROL START - Initiates the network transport functional entities
- NETCONTROL STATUS - Displays the status of the network transport functional entities
- NETCONTROL STOP - Terminates the network transport functional entities (Immediately terminates the Network Services)
- NETCONTROL UPDATE - Dynamically updates selected network transport configuration parameters for an active network interface
- NETCONTROL TRACE - Enables or disables message tracing for a specified network transport functional entity
- NETCONTROL VERSION - Displays the version of the software modules of the network transport

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NSCONTROL

- NSCONTROL ABORT - Immediately terminates the Network Services
- NSCONTROL LOG - Enables or disables detailed logging (configured as CLAS0004 of SUB0006) for the Network Services
- NSCONTROL START- Initiates the Network Services
- NSCONTROL STATUS - Displays status information about the Network Services
- NSCONTROL STOP - Allows existing users to continue with current task, but prevents initiation of any new tasks or new users for the Network Services
- NSCONTROL VERSION - Displays the version of the software modules of the Network Services

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Important Files

- NMCONFIG.PUB.SYS
- NMCBACK.PUB.SYS
- NSDIR.NET.SYS
- @.NET.SYS
- @.ARPA.SYS
- @SAMP@.@.SYS
- HPSWINFO.PUB.SYS

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Important Utilities

- NETTOOL
- NMDUMP
- NMMMAINT
- NMMGRVER
- NMMGRVAL

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e3000 Network Functions

- DTC – Async device communications (terminals, PCs, modems, printers)
- NS/VT & Telnet – network logon sessions
- 3000 to 3000 communications (NS)
- Network printing
- File Transfer (FTP, EDI, XML)
- Internet Applications

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DTC

Datacommunications and Terminal Controller

- DTC types (DTC48, DTC72MX, DTC16iX)
- Host configuration via NMMGR
- Openview DTC Manager
- DTC Manager/UX
- Used to connect modems, serial terminals and PCs, serial printers

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DTC Alternatives

- Replace terminals with PCs and use emulator
- Use browser to access (Reflection Web, Javelin)
- Move printers to JetDirect (parallel or in printer)
- Run serial printers on Intel print servers with 3rd-party spooler
- Use dialup servers to connect to 3000 (Citrix Winframe, Windows Terminal Server)
- Use a VPN to connect to 3000 remotely

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Network Session

- Use NS/VT or Telnet to connect to 3000
- Reflection
- Minisoft
- QCTerm
- Reflection for web
- Javelin
- ScreenJet/3000

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3000 to 3000 Communications

- FTP
- Telnet
- NS3000/iX (\$\$\$)
- Remote Hello
- DSCOPY
- Remote peripheral access
- Netbase Shadowing

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Network printing

- Native support in MPE/iX 5.5
- Free
- Easy to configure
- Not as flexible as third-party print options (only supports JetDirects)
- Alternatives (Quest NBSpool, ESPUL, Minisoft, SpoolMate, others)

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File Transfer

- PC to host (Reflection, Minisoft)
- FTP
- DSCOPY (3000 to 3000)
- Netbase
- Samba

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Internet Functions

“The HP 3000 Internet Services consist of a set of programs that help the HP 3000 computer exchange information with other nodes on the Internet.”

- Telnet
- TFTP
- BOOTP
- REMSH
- Samba/iX
- DNS BIND/iX
- Apache/iX
- WebWise MPE/iX Secure Web Server

Source: Configuring and Managing MPE/iX Internet Services

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INETD: Internet Daemon

- INETD.NET.SYS
- JINETD.NET.SYS
- SERVICES.NET.SYS
- PROTOCOL.NET.SYS
- INETDCNF.NET.SYS
- INETSECD.NET.SYS

Source: Configuring and Managing MPE/iX Internet Services

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Network Performance

- No real tools to measure network performance
- Attach e3000 to a SNMP managed port on switch
- Use Network Management tool (Openview, Ciscoworks) for measuring and monitoring network port
- Faster links will increase data transfer throughput

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Tips

- On a 100Base-T card, don't use the Autosense capability
- Stay away from thinlan whenever possible
- Be careful with validate (network may not start on reboot)
- Connect HP interfaces to switched ports
- Use a managed switch (monitor traffic load, congestion, problems)

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Resources

HP manuals: <http://docs.hp.com> – many downloadable PDF files

- *HP 3000/iX Network Planning and Configuration Guide*
- *Using the Node Management Services (NMS) Utilities*
- *Configuring Systems for Terminals, Printers, and Other Serial Devices*
- *Using NS 3000/iX Network Services*

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Contact Information

- Email: davef@esgs.com
- Office: 805-648-7372
- Fax: 805-648-7436

Prism Network Solutions
21 S. California St. #306
Ventura, CA 93001

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