DT-7000

IP-CommKit™ Host Network Interface

User's Manual

Release.Version 1.0

Issue 2

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APPLICATIONS, INC

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Important Safety Instructions

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

When installing, operating, or maintaining this equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Read and understand all instructions.
- Follow all warnings and instructions marked on this product.
- For information on proper mounting instructions, consult the User's Manual provided with this product.
- The telecommunications interface should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection.
- This product should only be operated from the type of power source indicated in the User's Manual.
- This unit is powered from either –48 V DC, -24 V DC or AC voltage sources. See later sections in this manual before connecting to the power source.
- The –48 V DC input terminals are only provided for installations in Restricted Access Areas locations.
- Do not use this product near water, for example, in a wet basement.
- Never touch uninsulated wiring or terminals carrying direct current or leave this wiring exposed. Protect and tape wiring and terminals to avoid risk of fire, electric shock, and injury to service personnel.
- To reduce the risk of electrical shock, do not disassemble this product. Trained personnel should perform Service only. Opening or removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect re-assembly can cause electric shock when the unit is subsequently used.
- For a unit intended to be powered from –48 V DC voltage sources, read and understand the following:
  - This equipment must be provided with a readily accessible disconnect device as part of the building installation.
  - Ensure that there is no exposed wire when the input power cables are connected to the unit.
  - Installation must include an independent frame ground drop to building ground. Refer to User's Manual.

This symbol is marked on the DT-7000, adjacent to the ground (earth) area for the connection of the ground (earth) conductor.

- This Equipment is to be Installed Only in Restricted Access Areas on Business and Customer Premises Applications in Accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No. 70. Other Installations Exempt from the Enforcement of the National Electrical Code May Be Engineered According to the Accepted Practices of the Local Telecommunications Utility.

❑ For a unit to be used with an AC Wall Plug-In Unit, read and understand the following:

- The DT-7000 was tested with the PHIHONG, Model PSA-30U-240 wall plug-in unit, which is an approved AC to –24 VC DC Wall Plug-In unit.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- Do not staple or otherwise attach the power supply cord to the building surfaces.
- Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
- The socket outlet shall be installed near the equipment and shall be readily accessible.
- The Wall Plug-In unit may be equipped with a three-wire grounding type plug, a plug having a third (grounding) pin. This plug is intended to fit only into a grounding type power outlet. Do not defeat the safety purpose of the grounding type plug.
- Do not allow anything to rest on the power cord. Do not locate this product where persons walking on it may abuse the cord.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

  a) When the power supply cord or plug is damaged or frayed.

  b) If liquid has been spilled into the product.

  c) If the product has been exposed to rain or water.

  d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by qualified technician to restore the product to normal operation.

  e) If the product has been dropped or the cabinet has been damaged.

  f) If the product exhibits a distinct change in performance.

SAVE THESE INSTRUCTIONS

1 INTRODUCTION

Datatek Applications, Inc. provides several products specifically engineered to facilitate the migration from networks based on the Lucent Technologies BNS-2000/BNS-2000[1] VCS family (a.k.a. Datakit® II VCS) to Internet Protocol (IP) networks. The DT-7000 is the final product that is needed to complete the migration.

Datatek previously provided high-level migration plans[2] by which a customer's BNS network may be reduced to one or more nodes. These nodes that are remaining would now only need to handle the COMMKIT hosts that serve the Operations Systems (OS) applications. As a further step in the migration, if the CPM-HS modules were replaced in the remaining nodes with Universal Trunk Modules (UTM's) and the CommKit software in the hosts with IP-CommKit™ software, the connections between the nodes and hosts could now traverse an IP network. An additional benefit is that the remnant BNS nodes no longer needed to be co-located with the OS hosts. Furthermore, in the nodes, the Universal Mediation Interface modules (UMI's) could be used. These modules allow connectivity over IP to non-BNS endpoints, thereby eliminating the need for the BNS network to have any endpoint connectivity.

The net result of the migration strategies presented prior to the introduction of the DT-7000 was a remnant set of BNS nodes whose sole purpose was to interface to IP-COMMKIT hosts and to the IP network via UMI modules for endpoint connectivity. While all other BNS modules may have been retired from this scenario by employing the proper Datatek migration products, the BNS/Datakit node's cabinet, shelves, controller modules, UTM, and UMI modules must be continued in service.

With the introduction of a new product, the DT-7000, the final step in the migration to a totally IP network can be completed. The DT-7000 will allow the retirement of the remnant set of nodes and hence, the last vestiges of the Lucent Technologies BNS/Datakit network.

To aid the reader's understanding, the documents shown in the Table 1 on the next page provide good introductory material. All of the documents can be accessed at the Datatek web site: ***www.datatekcorp.com***. Use the hyperlinks embedded in the first column of Table 1.

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[1] Henceforth in this document all node types (BNS-2000, BNS-2000 VCS, Datakit II VCS, etc. or the data network itself will be referred to as **BNS** nodes or the **BNS** network.

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[2] Read the documents ***Migration Strategies For BNS-2000 Networks*** and ***BNS-2000 / IP Network Integration Strategies*** available on the Datatek web site, ***www.datatekcorp.com***, for more detail on the migration strategies.

™IP-CommKit is a trademark of Lucent Technologies, Inc, licensed to Datatek Applications, Inc., a company independent from Lucent Technologies.

Background Documentation

Document	Scope
The Final Step in the Migration of BNS Networks to IP	The Datatek DT-7000 allows the retirement of remnant Datakit and BNS nodes saved for communication with CommKit and IP-CommKit connected hosts. Learn how the last vestiges of a BNS/Datakit network can be eliminated transparently and migrated to IP.
BNS-2000 / IP Network Integration Strategies	Datatek Applications has developed a family of products which allow existing BNS-2000 and IP networks to be integrated to provide seamless operation, typically as part of a longer-term migration strategy from BNS-2000 towards the newer networking infrastructures.
Migration Strategies For BNS-2000 Networks	A series of incremental migration steps applicable to a typical BNS-2000-based OSDN is presented. At each step in the process, there is positive economic benefit and minimal disruption to users.
Universal Mediation Interface (UMI) Module User's Manual	Describes the use and configuration of the BNS Network to IP Network Mediation module
Universal Trunk Module (UTM) User's Manual	Describes the use and configuration of the BNS Universal Trunk Module and its use for connection to a IP-CommKit host
IP-CommKit Overview	Describes IP-CommKit and compares it with CommKit

Table 1: Background Documentation

2 OVERVIEW

2.1 INTEGRATED BNS NETWORK ENVIRONMENT – NO DT-7000

Below is a picture of a BNS network that has been partially migrated to an IP network. Some of the OS hosts, network elements and terminals have been migrated off of the BNS network onto the IP network. However, many of these terminals and network elements devices still need access to the OS hosts that are connected to the BNS network. This is accomplished through the use of UMI and UTM modules in the node. A UTM module mimics the functions of a CPM-HS module but interfaces with the IP network and a host running IP-CommKit instead of CommKit. The UMI module mediates legacy protocols sent via IP into the internal BNS protocol. The BNS node is still a fundamental component in the network, but the objective is to migrate to a totally IP network.

In the mixed IP and BNS network, a typical data call is handled as follows: Each CommKit and IP-CommKit host is connected to a node via a CPM-HS or UTM module respectively. These modules are responsible for communication with the node backplane and indirectly the BNS controller. Using the fiber-connected host as an example, a call travels from the host application through the CommKit software through the fiber cable to the node through the CPM-HS module onto the backplane. It then proceeds through the node's switch module, onto the broadcast bus, and out of the node through the UMI module to the IP network. Typically, the call continues into the DT-6160 application, back out again to the DT-4XXX[3] mediation device, and finally out the DT-4XXX data port to the Network Element using the native protocol of the network element. The call has to proceed through two networks: the BNS network and the IP network. Hence, in this mixed network, the BNS node is still needed. The ultimate objective is to eliminate the need for BNS nodes and therefore, the entire BNS network.

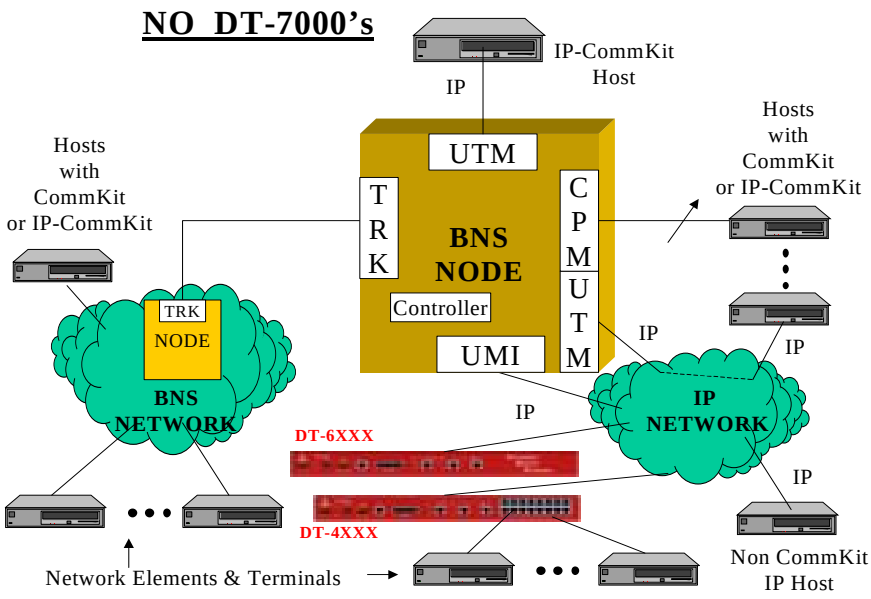

Figure 1: Traditional Mixed BNS and IP Network

[3] DT-4XXX refers to any member of the DT-4XXX family that includes DT-4000, DT-4180, DT-4280, DT-4216, DT-4232, and DT-1032.

2.2 MIGRATION COMPLETION USING DT-7000'S – NO BNS NETWORK

The short-term objective is to eliminate each BNS node one at a time. Long-range, the objective is to replace the entire BNS network with an IP network. Another objective is to make the transition transparent to the users and the application on an OS host; that is, the application on the host will continue to use the functionality of IP-CommKit but will not be required to make any changes in the application software, operations tables, or procedures. A host must believe that it is still talking to a BNS network using BNS names and routing even though it actually will communicate with the network elements and users over an IP network. *The DT-7000 together with IP-CommKit in the host will fulfill these requirements.*

The DT-7000 is the last piece in the migration product evolution that is needed that will allow the completion of the migration to a completely IP network. The DT-7000 will perform this function transparently to the host and the endpoints.

Each DT-7000 will replace the functionality of one CPM-HS or UTM, the backplane and switch, BNS controller, UMI module and the CommKit/IP-CommKit communication processing previously performed in the node. Now the data call described in the previous section will be handled as follows: The call will travel from the host application through the IP-CommKit software through the LAN module in the host to the IP network and into the DT-7000. The call then will be routed via the DT-7000 out through its UMI equivalent interface into the IP network to the DT-6xxx. The call will continue as described previously. Thus, only the IP network will be needed There is no longer any dependency on BNS networks.

Using the DT-7000, the previous network picture will now become:

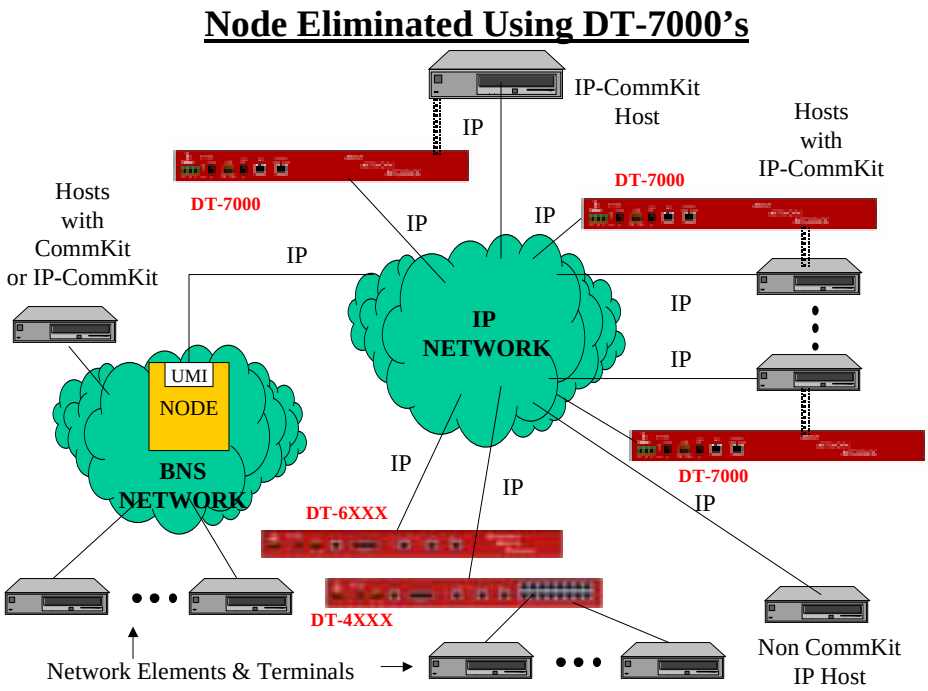

Figure 2: Mixed Network with DT-7000's

A node has been eliminated in the figure above by employing DT-7000's. Each connection to a CommKit or IP-CommKit host has been replaced with a DT-7000. Each DT-7000 communicates with other IP endpoints including other DT-7000's connected to IP-CommKit hosts using only the IP network.

An IP-CommKit host can have more than one connection to the BNS network via UTM modules. In the IP-only network, each connection will be replaced by a separate DT-7000. Each DT-7000 will be physically connected directly to the IP network through its 10/100 Base T port. The IP-CommKit host also will be physically connected directly to the IP network via its ethernet LAN module. However, each DT-7000 has one and only one IP-CommKit host *logically* connected to it. This host is known as its *associated* host. (The dotted lines in Figure 2 above show the logical connection between a DT-7000 and its associated IP-CommKit host.)

The DT-7000 will communicate with other non-IP-CommKit endpoints via its built-in UMI functionality. The DT-7000 will perform the equivalent of the old BNS controller call-setup functions between the host logically connected to it, other DT-7000's and their hosts, and other non IP-CommKit endpoints in the IP network.

IP-CommKit is required in place of CommKit in a host. Replacing CommKit with IP-CommKit in the host is usually transparent to the application using the interface. A benefit is that the specially developed CommKit hardware module is no longer needed in the host. Instead, the standard host ethernet interface is used. A second benefit is that the host can be located anywhere in an IP network. There is no need to collocate the DT-7000 and its "*associated"* IP-CommKit host.

IP-CommKit is available for use on a host whose operating system is one of the following:

- AIX® V4.3 (32-bit kernel)
- AIX V5.2 (32-bit kernel)
- HP-UX ®10.20 (32-bit kernel)
- HP-UX 11.00 (32-bit kernel)
- HP-UX 11.00 (64-bit kernel)
- HP-UX 11.11 (32-bit kernel) (Also known as 11i)
- HP-UX 11.11 (64-bit kernel) (Also known as 11i) (64-bit library also available)
- NCR SVR4 MP-RAS® (Single processor or Multi-processor)
- SCO Open UNIX® 8
- Solaris® 2.6 (32-bit kernel)
- Solaris 7 (32/64-bit kernels)
- Solaris 8 (32/64-bit kernels) (64-bit library also available)
- Solaris 9 (32/64-bit kernels)

® AIX is a registered trademark of IBM.
® HP-UX is a registered trademark of Hewlett Packard, Inc. Systems Division
® MP-RAS is a registered trademark of NCR.
® UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.
® Solaris is a registered trademark of SUN Microsystems, Inc.

2.3 DT-7000 LOGICAL OVERVIEW

As described above, each DT-7000 replaces the functionality of one CPM-HS or UTM, the backplane and switch, BNS controller, UMI module and the CommKit communication processing previously performed in the node. In the figure below a logical representation of the DT-7000 is shown. The DT-7000 is an IP entity with its own IP address. Besides the console interfaces, it has three other primary interfaces:

- Logical UTM -Interface to the IP-CommKit connected host. This is the same host as the one originally connected on the fiber.
- Logical UTM to UTM -Interface to peer DT-7000's, each supporting its own associated IP-CommKit host.
- Logical UMI Interface - Interface to non-CommKit/IP-CommKit hosts or other IP endpoint devices (e.g. DT-6XXX, a IP- based printer, a UMI in a BNS node, etc.)

Understanding these interfaces will enhance your understanding of the commands needed to configure and operate the DT-7000 in an IP network. Figure 3 will be useful as a reference when configuring and operating a DT-7000.

Logical DT-7000 Interfaces and Functions

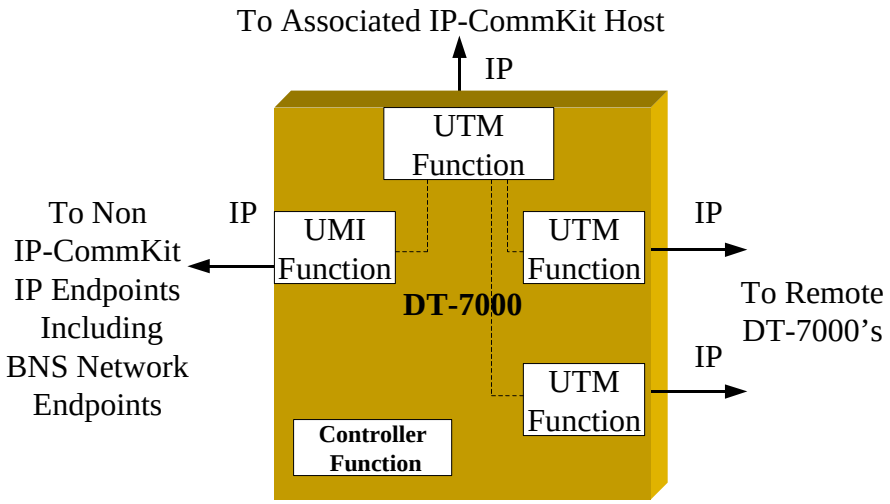

Figure 3: Logical DT-7000 Interfaces and Functions

2.4 DT-7000 FEATURES

The DT-7000 has many important features and functions.

- The DT-7000 supports one associated IP-CommKit host via the UTM protocol. The UTM interface supports up to 509 user channels plus the signaling and maintenance overhead channels.
- The DT-7000 supports up to 504 endpoint connections for asynchronous or synchronous traffic analogous to the functions of a UMI.
- The DT-7000 can connect to up to 64 other DT-7000's for host-to-host IP-CommKit services such as Push, Pull, DK, etc.
- The DT-7000 supports the host-to-host CommKit services, such as Push, Pull, etc. when the peer host is resident on a BNS network. This is performed by the DT-7000 host interface using the CKTPROXY application of the DT-6xxx (Future development). The DT-7000-to-DT-7000 and DT-7000 to CKTPROXY interfaces are treated identically.
- The DT-7000 may map up to 504 dial-strings. The mapping is to a type of interface, the IP address or DNS name, and the TCP port number to use.
- The DT-7000 may map up to 504 TCP port numbers. The mapping is to a dial-string (with service codes) to be sent to the IP-CommKit host on a call receipt.
- The DT-7000 supports a serial console, a telnet console for configuration, and a separate telnet port dedicated for output of trace/snooper information.
- The DT-7000 supports configuration backup to a generic IP device via FTP.
- The DT-7000 supports release-keyed software.
- The DT-7000 implements closed user groups (CUGs) on the SNMP agent, the telnet console, and the DT-7000 "UMI" interface. Up to 32 CUGs may be defined in the DT-7000. Via the "UMI" interface, CUGs restrict which callers are allowed access to the locally associated IP-CommKit host.
- The DT-7000 is available in a redundant configuration to provide high availability of the user's applications. A single *active* DT-7000 is coupled with a *standby* DT-7000 that is ready to take over automatically if the *active* DT-7000 fails for any reason. After the failed DT-7000 recovers, it is returned to service as *standby.*
- The DT-7000 supports hunt groups, both on input and output, through its logical UMI to IP network interface.
- The DT-7000 supports a set of domain-style host names, analogous to the /etc/hosts file on both UNIX and Microsoft Windows platforms. This allows the DT-7000 to perform a translation between a domain-style name and its associated IP address and TCP port number, for BNS-to-IP calls. The use of a domain-style name is optional; the DT-7000 will always accept an IP address in its base form.
- Additionally, the DT-7000 allows for the definition of an external DNS to be used for translation of domain-style internet addresses not defined in the internal host table. Three DNS name server IP addresses are supported by the DT-7000.
- The DT-7000 contains an SNMP Version 1 agent and supports a large array of MIB variables.
- The DT-7000 can be powered by any one of three methods: over its ethernet connection, by -48V DC input, or by 115 AC to 24V DC input. For redundancy, any two of the methods can be used simultaneously.

3 PHYSICAL DESCRIPTION

Figure 4: DT-7000 Front View

3.1 POWER INTERFACES

3.1.1 48V DC POWER - IN

The DT-7000 rack-mount or stand-alone accepts DC power input from a 48V DC power source that terminates into a three position connector that accepts return, minus, and ground power wires. This connector plugs directly into a terminal block labeled 48V DC on the DT-7000 faceplate and is secured by two screws. The connector accommodates 10-awg to 14-awg (American Wire Gauge) wire. The acceptable voltage range is 36 through 72 volts inclusive.

An optional strain relief clamp is available separately for DC wire stabilization.

3.1.2 24V DC POWER - IN

Rack-mounted or operating stand-alone, the DT-7000 accepts DC power input directly from a 24 V DC (nominal) via a circular connector. The circular connector is labeled 24V DC on the DT-7000 faceplate. The acceptable voltage range is 18 through 72 DC volts inclusive.

3.1.3 AC POWER - IN

For this application, a separate AC power supply is available (for example, the PHIHONG, Model PSA-30U-240 wall plug in unit). The power supply has a six-foot long cable that terminates with a barrel connector. The power supply plugs into a standard 115V/240V AC outlet. The output of this supply is 24V DC. The barrel connector plugs into the circular connector labeled 24V DC on the DT-7000 faceplate. The actual, acceptable voltage range is 18 through 72 volts DC inclusive.

3.1.4 POWER OVER ETHERNET (POE)

The DT-7000 will accept –48V DC (36 through 72 volts inclusive) power on the LAN connection using the **POE** specification. When the power is provided via the LAN, no additional input power is required by the DT-7000.

3.1.5 DC POWER - OUT

The DT-7000 provides a separate -5V DC power connection for powering an external device. This interface is used to provide power ***out*** of the DT-7000 (maximum of 2.75 AMP draw) and ***never*** *to provide power (Power-in) to the DT-7000.*

3.2 ALARM

The Alarm Grid connector is a three position (Failed Open, Closed, Failed Closed) terminal block labeled ALARM on the DT-7000 faceplate. The terminal block connectors accommodate 10-awg to 14-awg (American Wire Gauge) wire.

3.3 SERIAL CONSOLE (CON)

This interface requires a standard RJ45 terminated, twisted pair, data cable. It connects as data terminating equipment (DTE) to an asynchronous device and uses RS-232C signaling. Connection to the DT-7000 serial console is required for any basic DT-7000 administration (for example, setting the unit's IP address). Otherwise, the serial console can be disconnected during normal operation, and *telnet* console access via TCP port 1023 can be used. Note that the console cable may need special wiring for use with certain devices. (More detail is contained in sections 4.4.1 and 8.)

The serial console is used for initial configuration and is configured as 9600 bps, 8 bits, and no parity.

3.4 10/100 BASE-T LAN

This interface requires a standard RJ45 terminated Category 5, twisted pair, data cable. It is connected to a 10 Base-T or 100 Base-T hub, or the 10/100 port of an etherswitch or router on the local LAN segment. The LAN port supports TCP/IP peer-level protocols (e.g. TELNET, TCP, IP, ARP, SNMP, etc.). The LAN interface will automatically negotiate the speed and whether half or full duplex with the network interface PHY.

3.5 LEDS

The DT-7000 faceplate contains light emitting diodes (LEDs) used to report DT-7000 activity and behavior.

LED	LED	LED Description
PWR	Green	Unit Power Indicator
ALARM	Red	Reset Indicator & General Failure Indicator
LNK/ACT	Green	10/100 Base -T Link/Activity Indicator – On if ethernet Cable Connected and Powered / Blinks if Activity
DPX/COL	Green	10/100 Base -T Full-Half Duplex/Collision Indicator – Off for Half Duplex / On for Full Duplex / Blinks When Collisions

Table 2: DT-7000 LEDs

4 EQUIPMENT INSTALLATION

This chapter contains the steps required to install and power the DT-7000.

Figure 5: DT-7000 Front View

4.1 UNPACKING AND INSPECTION

Unpack and inspect the DT-7000 unit and other components and have on hand a #2 Phillips screwdriver. Note that the DT-7000 does not have any user serviceable parts or jumpers/straps internally within the unit. *Opening the unit and breaking the seal voids the warranty on the unit.*

4.2 REQUIRED EQUIPMENT

The following items are needed when a DT-7000 unit is being installed:

- DT-7000 unit
- A 100-240V AC to –24V DC power supply or a terminal block connector (supplied with the DT-7000) for –48V DC that plugs into the unit.
- Cables (See the cabling sections 4.4, 4.5 and 8 for required Console and data cable types and their configuration). **Note: Shielded cables must be used in order to maintain compliance with EMC requirements.**
- A strain relief clamp for wire stabilization *(-48V DC operation ONLY).*
- An EIA standard 19-inch or 23-inch equipment rack with internal, vertical mounting rails. Hole spacing on the vertical, mounting rail must be 1.25 inches. Use the dimension specifications in section 13 (Appendix F) to calculate how high the rack needs to be to support a specified number of DT-7000 units *(rack-mount configuration ONLY*).
- A pair of mounting brackets *(19" or 23")* for each DT-7000 *(rack-mount only*).
- An environmental operating temperature of 5 to 40 degrees Centigrade is required when the DT-7000 is rack-mounted.

4.3 MOUNTING AND POWER WIRING

4.3.1 INSTALLATION FOR AC OPERATION

1) *Stand-Alone:* Attach the provided feet to the bottom of the unit
   Rack-Mount: Attach the mounting brackets to each side of the DT-7000. *Note: Brackets have a left or right designation. With the DT-7000 facing toward you, the left bracket is attached to the left side of the DT-7000. Left-sided brackets are distinguished by the two pre-tapped screw holes residing on the front facing portion of the bracket.*
2) *Stand-Alone:* Place the DT-7000 in the desired location, such as a shelf in a data equipment rack.
   Rack-Mount: Fasten the DT-7000 to the equipment rack using appropriate screws *(typically supplied by the equipment rack manufacturer)*.
3) Attach the LAN data transport cable.

4) Attach the console cable by plugging one end of an RJ45-terminated twisted-pair data cable into the DT-7000 console interface and the other into the port of the asynchronous device that will be used to configure or manage the DT-7000.

5) Plug the power supply into a standard 240 or 115V AC outlet and the barrel connector on the power supply cable into the circular connector on the DT-7000 faceplate labeled 24V DC. (The DT-7000 was tested with a PHIHONG Model PSA-30V-240 Supply, Input 100 –240 V AC, Output 24 V DC 1.25 Amperes)

4.3.2 INSTALLATION FOR -48V DC OPERATION

1) *Stand-Alone:* Attach the provided feet to the bottom of the unit
Rack-Mount: Attach the mounting brackets to each side of the DT-7000. *Note: Brackets have a left or right designation. With the DT-7000 facing toward you, the left bracket is attached to the left side of the DT-7000. Left-sided brackets are distinguished by the two pre-tapped screw holes residing on the front facing portion of the bracket.*

2) *Stand-Alone:* Fasten the strain relief to the side of the DT-7000.
Rack-Mount: Fasten the strain relief to the DT-7000 rack-mount bracket.

3) *Stand-Alone:* Place the DT-7000 in the desired location, such as a shelf in a data equipment rack.
Rack-Mount: Fasten the DT-7000 to the equipment rack using appropriate screws *(typically supplied by the equipment rack manufacturer).*

4) Attach the LAN transport cable.

5) Attach console cable by plugging one end of an RJ45-terminated twisted-pair data cable into the DT-7000 console interface and the other into the port of the asynchronous device that will be used to configure or manage the DT-7000.

6) Run 48V DC (return, -48, and ground) wires from a central source through the strain relief clamp for DC wire stabilization. On the DT-7000 faceplate, attach the return, -48, and ground wires to the return, -48, and ground connections, respectively, on the terminal block labeled 48V DC.

7) Rack-Mount: The Environmental Operating Range of 5 to 40 degrees C (41 to 104 degrees F) is necessary to maintain compliance with UL.

4.3.3 INSTALLATION FOR POWER OVER ETHERNET (POE) OPERATION

1) *Stand-Alone:* Attach the provided feet to the bottom of the unit
Rack-Mount: Attach the mounting brackets to each side of the DT-7000.

2) *Stand-Alone:* Place the DT-7000 in the desired location, such as a shelf in a data equipment rack.
Rack-Mount: Attach the mounting brackets to each side of the DT-7000. *Note: Brackets have a left or right designation. With the DT-7000 facing toward you, the left bracket is attached to the left side of the DT-7000. Left-sided brackets are distinguished by the two pre-tapped screw holes residing on the front facing portion of the bracket.*

3) Attach console cable by plugging one end of an RJ45-terminated twisted-pair data cable into the DT-7000 console interface and the other into the port of the asynchronous device that will be used to configure or manage the DT-7000.

4) Connect an ethernet LAN cable to the 10-100 Base-T port and the other end to a POE Injector. The POE Injector is connected by a second ethernet cable to the local hub or router.

5) Connect the POE Injector to the output of a power supply that provides at least 200 mA at –48V DC. (This capability was tested with a HyperLink Technologies Model BT-CAT5-P1 ethernet injector using a HyperLink Technologies Model PSU15B-8 Power Supply. That supply has an input of .5 A at 100 –240 V AC and output of .31 A, 15 watt Max. at –48 V DC.)

6) Rack-Mount: The Environmental Operating Range of 5 to 40 degrees C (41 to 104 degrees F) is necessary to maintain compliance with UL.

4.4 CONSOLE CONNECTION AND CONFIGURATION

4.4.1 CONSOLE CABLING

The DT-7000 is managed through its console port by a terminal, PC, dial-up modem, or BNS asynchronous connection.

Console cables are available from your DT-7000 reseller and may be required for console connection through BNS TY12 modules, MSM modules, and SAM64/504 Multiplexors, or an Ortronics distribution patch panel *(See Figure 6 and* Table 3: Console Cable Order Information *below).* Specific instructions for configuration of a BNS SAM, TY12 and MSM asynchronous ports are available in the appropriate BNS module, reference guide. DT-7000 specific configuration notes are described herein.

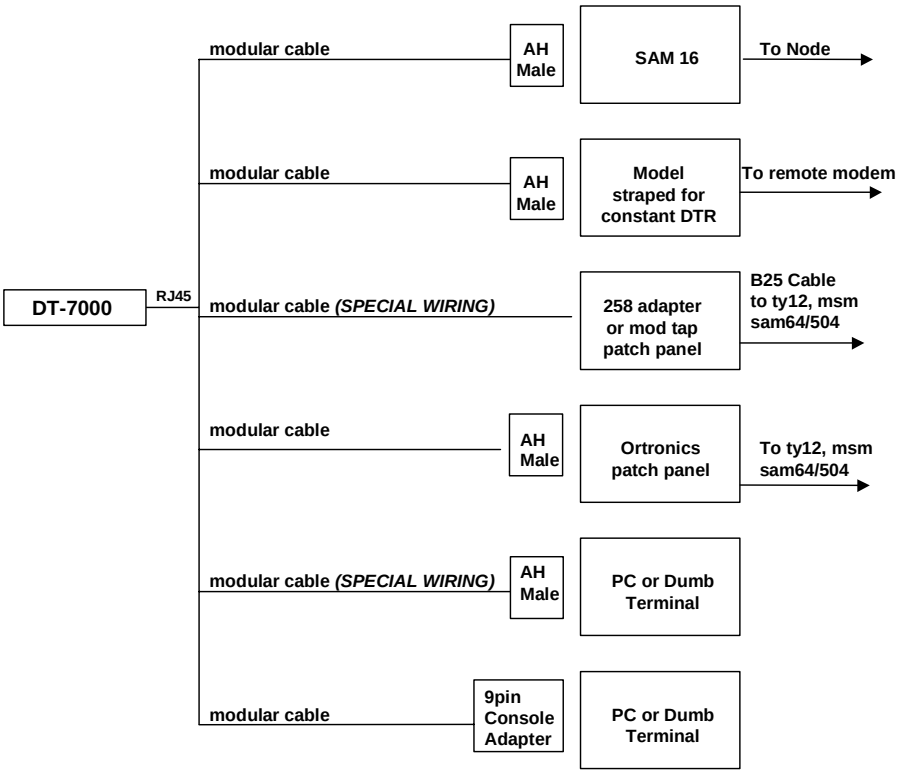

Figure 6: Console Wiring Options

Table 3: Console Cable Order Information

Cable or Adapter	Order Information (Lucent Technologies)	Order Information (CBM of America)
8 pin modular to 8 pin modular cable *(standard)*	Comcode 408981653 (25')	P-10419-XX (XX ' length)
8 pin modular to 8 pin modular cable *(special wiring) (25')* - The wiring schematic is shown in Appendix A.	Comcode 408198133	DTCONCAB-25
Male 25 pin to 8 pin connector *(AH Male)*	ED5P055-31 G(139)	ADPG139
258 Adapter	ED5P055-31 G(155)	ADPG155

Important! A modular cable with "SPECIAL WIRING" can be ordered using the table above or built using the wiring diagrams provided in this manual in section 8. The pin-outs for the 9-pin connector is shown in section 8.2.

4.4.2 Console Configuration Notes

- Configure SAM, TY12 and MSM console connections as 9600 bps with 8 bits and no parity, and use a DCE type cable.
- Configure SAM and MSM console connections as type "host" and as a "pap" (permanently active port).
- Configure TY12 console connections as type "console".

4.5 Data Connections - LAN Port

The DT-7000 is connected to the LAN through its 10/100 Base-T auto sense port. Connect a standard Category 5 twisted-pair data cable terminated with an RJ45 connector to the DT-7000 at the port labeled LAN. Connect the other end to a 10/100 Base-T hub, etherswitch, or router on a local LAN segment that provides access to a wide-area IP-based network. Category 5 cables can be obtained through CBM of America or your local supplier.

Cable	Order Information CBM of America
Category 5 10 Base-T	P-10596-XXX*
Category 5 100 Base-T	P-11754-XXX*
*XXX is cable length desired	

Table 4: Category 5 Cable Ordering Information

5 QUICK-START CONFIGURATION GUIDE

Below is a sample DT-7000 configuration sequence. See section 6 for more detail on all the commands.

5.1 PLATFORM CONFIGURATION

The following is the command sequence for the initial configuration of the DT-7000. A DT-7000 has two console types: a hardwired *serial* port console and a *telnet* console. (Telnet to TCP port 1023.) The IP address, submask, and gateway IP address must be set first using the *serial* console. Subsequent commands can then be executed using either the *serial* console or via *telnet*. In order for the new parameter values to take effect, the DT-7000 must then be rebooted. Reboot restarts the DT-7000, and it also logs the consoles out.

<DT-7000> login passwd=initial ↵ *enter "logged: in mode*
User is logged in
<DT-7000> date 11:05:00 05/21/2004 ↵ *enter date & time (optional)*
Fri May 21 11:05:00 EDT 2004
<DT-7000> ipaddr 135.17.59.240 ↵ *enter IP address of DT-7000*
You must reboot for this change to take effect
<DT-7000> submask 255.255.255.0 ↵ *enter Subnet Mask of DT-7000*
You must reboot for this change to take effect
<DT-7000> gateway 135.17.59.1 ↵ *enter Gateway Address of DT-7000 if necessary*
You must reboot for this change to take effect
<DT-7000> hostname killie ↵ *enter the name of this DT-7000, not the host directly associated with this DT-7000.*
You must reboot for this change to take effect
<DT-7000> reboot ↵

If this DT-7000 is part of a redundant pair, in order to enable the high availability feature, the **ipother** and **ippublic** addresses must be configured also.

<DT-7000> ipother 135.17.59.241 ↵ *enter IP address of the other DT-7000*
You must reboot for this change to take effect
<DT-7000> ippublic 135.17.59.239 ↵ *enter IP address that other devices will access this DT-7000 pair.*
You must reboot for this change to take effect.
<DT-7000> reboot ↵

If a label for the console prompt is desired, now is a good time to define it.

<DT-7000> label killie ↵
<killie: DT-7000>

Before the logical entities can go into service, the software must be registered.

Run the **register** command, which will produce the output similar to that shown below. Contact Datatek with the information in order to obtain the software key. Rerun the **register** command and enter the software key at the prompt.

<killie: DT-7000> register ↵
Product_Code=DT7000
MAC=0.96.29.2.62.110
HW_SERNUM=0.0.8.9.179.188

```
Build_Number=3
Build_Date="Thu Jul 3 08:49:46 EDT 2003"
Enter key: ↵ (Call Datatek with the above information to obtain the key
and enter it here, or hit return as shown here and rerun the command later
after obtaining the key.)
That key is not valid
<killie: DT-7000>
```

5.2 CONFIGURE THE LOCAL IP-COMMKIT HOST

Next, enter the configuration for the IP-CommKit **host** that is directly associated with this DT-7000. In the example that follows, *london* is the name of the server on the IP-CommKit host, and the area code and exchange are the area code and exchange name of the BNS node to which this IP-CommKit host was formerly connected.

```
<killie: DT-7000> host dest=135.17.59.238 server=london area=nj exch=test
<killie: DT-7000> res host
<killie: DT-7000> vfy host
  IP-CommKit host In Service, Dead. IP Addr: 135.17.59.238
  Area/Exch: nj/test/
    Servers: london
  Server channel is down
```

If you have not done so already, install the IP-CommKit software in the host and do the necessary configuration on the host itself. Detailed instructions are given in the Datatek IP-CommKit Installation and Administration Guide for the operating system used by the host.

5.3 CONFIGURE PEERS

If the host associated with this DT-7000 needs to communicate with another IP-CommKit host that is associated with another DT-7000, then this DT-7000 needs to have the other host's associated DT-7000 configured as a **peer**. Also this DT-7000 and its associated host's server name must be configured as a peer in the remote DT-7000. Otherwise communication between the two will not work. The IP address is the IP address of the remote DT-7000, not its associated host, (tibby in the following example). See section 6.7.2 for more detail.

```
<killie: DT-7000> peer 30 dest=135.168.20.2 server=tibby ↵ define a peer
<killie: DT-7000> vfy peer 30 ↵ verify the configuration
IP-CommKit peer 30 Out of Service, IP Addr: 135.168.20.2
      Names: tibby
      INIT RECV at port 0 OOS
<killie: DT-7000> rs peer 30 ↵ restore it to service
<killie: DT-7000> vfy peer 30 ↵ verify it again
IP-CommKit peer 30 In Service, Dead. IP Addr: 135.168.20.2
      Names: tibby
      INIT RECV at port 0 OOS
<killie: DT-7000>
**REPORT ALARM: Peer 30 is not responding
```

5.4 CONFIGURE VPORTS

Define vports in a similar manner to defining a **vport** for a **UMI**. The **vport** command configures one or more virtual ports. It is through these vports that the IP-CommKit host associated with this DT-7000 communicates with IP endpoints other than other IP-CommKit hosts that are connected to remote DT-7000's. Examples of the IP endpoints are other IP hosts that do not use IP-CommKit, ports on DT-4000's connected to network elements, DT-6xxx's, LAN-based PCs, and endpoints on a BNS network[4], which also includes CommKit and IP-CommKit hosts connected to a BNS network via CPM-HS or UTM modules, respectively. A virtual port that waits for an incoming call from the IP network destined to the locally associated IP-CommKit host, is defined as **type=rcv**. A virtual port that originates calls from the locally associated IP-CommKit host to endpoints on the IP network is defined as **type=orig.** An example of each type is shown below. See section 6.7.3 for more detail.

5.4.1 EXAMPLE - TYPE=RCV

```
<killie: DT-7000> vport 33 type=rcv name=vport33 hport=40000
<killie: DT-7000> vfy vport 33

M vfy vport 33

     33 rcv OOSvc name=vport33
            hport=40000 cug=none
            prot=async crfix=trans data=trans crlf=trans
```

Note that only the **type**, **name,** and **hpor**t were input from the user. For the unspecified parameters, **prot, crfix data** and **crlf,** the software uses the default values. *Values of 1-5000 must not be used for **hport**.*

5.4.2 EXAMPLE – TYPE=ORIG

```
<killie: DT-7000> vport 34 type=orig name=umitobns dest=192.3.122.5
<killie: DT-7000> vfy vport 34

M vfy vport 34

     34 orig OOSvc name=umitobns
            dest=192.3.122.5 dport=23
            prot=async crfix=trans data=trans crlf=trans
```

Again the same four parameters plus the **dport** parameter take default values since they were not specified in the vport statement.

[4] The BNS network would have one or more UMI modules installed as its interface to the IP network. The vport on the DT-7000 would connect to a vport on the UMI in the BNS network that would in-turn connect through the BNS network to the endpoint on the BNS network.

6 DT-7000 COMMAND REFERENCE

6.1 INPUT CONVENTIONS

The parameters for all commands may be given on the command line. Parameters of the form **name=<value>** may be given in any order.

For several complex commands, the console user is prompted for missing parameters or corrections of errors in given parameters, of the form **name=<value>**.The user responds to a prompt for the **name** by typing the required **<value>** followed by *newline*. Defaults are supplied in some cases, so the user need only enter *newline*.

- The legal characters for command input are the upper and lower case letters, digits, spaces, tabs, and the following special characters: **!#%+,-./:=_**. Passwords have an expanded set of characters that can be used. See section 6.3.2 that describes the **login** command
- Commands may be entered in upper or lower case.
- Parameters of the form **name=value** may use upper, lower, or mixed case for **name**.
- Default values, if any, are shown in parenthesis as part of the prompt.
- Case is preserved for values, but values are not case sensitive in many commands.
- Values may not contain spaces, tabs, or the **=** character.
- Values for peer or vport numbers must be a number or range. Comma separated values are not supported. For example, **vport 1-2** is valid**; vport 1,2** is not.
- When a password is being requested by a prompt, the input is not echoed. See the **login** command (section 6.3.2) for the characters that are allowed in passwords.
- Backspace erases one character and @ deletes the current line of input. The delete (del) key kills most commands.
- The notation **<d.d.d.d>** used throughout this document signifies an IP address of the form **d.d.d.d** where each **d** is a value in the range **0 to 255**. The notation **<IP addr>** signifies an IP address that is specified as a numeric address of the form d.d.d.d. or a domain-style name that is ultimately resolved into an IP numeric address.
- Most commands cannot be entered without first *logging in* with a user-settable password. The only commands allowed without first logging in are:
  - help
  - login
  - rstpass

6.2 COMMAND OVERVIEW

The totality of commands has been divided into groups according to their use. Each group appears in its own section. The list of sections with the list of commands for each section is as follows:

Section Number	Category	Command List
6.3	**System Platform Configuration - Non IP Network Commands**	help login logout/exit label banner date timezone chgpass rstpass timeout
6.4	**System Platform Configuration - IP Network Commands**	cug console ipaddr ipother ippublic submask gateway hostname hosts dns
6.5	**Software Administration Commands**	backup install register retrieve version
6.6	**System Reset Command**	reboot
Entity Definition Commands		
6.7.1 **6.7.2** **6.7.3** **6.7.4**	Local Host Entity Remote DT-7000's Other Remote Endpoints Miscellaneous	host peer vport snmp
6.8	**Run-Time Commands**	dconn dmeas diag ping remove restore restart snoop tracert vfy
6.9	**Duplex Operation**	switchover stby stbyupd

Table 5: Command Reference Table

6.3 System Platform Configuration – Non IP Network Commands

6.3.1 Help

Syntax: help | ? [command]

The available commands on the DT-7000 system console, along with a short narrative, is available via the **help** or **?** command. In the help output, the command that is shown to the left of the colon is the primary command. Alternate forms are shown to the right as part of the explanation. Command-specific help is available as well. For example, help "L" shows help for all commands that begin with "L" or help "login" shows help for this specific command.

The **help** command is available regardless if the console user is logged in or out.

6.3.2 Login

Syntax: login passwd=<password>
or
Prompted Mode:
Syntax: login
password ? PASSWD=

The **login** command is used to allow access to the other commands. The legal characters for passwords are the upper and lower case letters, numbers, and the following special characters:

!# $%&'*+,-./:;< >?_{|}~.

Note that when inputting a password, all of these special characters are allowed in *prompted mode* only. Only the following special characters are allowed in passwords when the password is given on the same line as the word **login**:

!#%+,-./:;_

Passwords are case sensitive.

The **passwd** parameter given on the command line is not echo suppressed. However, if the **passwd** parameter is not provided in the command line, the console prompts for a password (i.e. *prompted mode*); the response *is* echo-suppressed in this case.

If the password is valid, the user is placed in the *logged in* mode. Once the console user is logged *in*, the rest of the commands are accessible. The **login** command is not accessible if the user is already logged in.

6.3.3 Logout and Exit

Syntax: logout
Syntax: exit

The **logout** command is only allowed if the console user is logged *in*.

The command uses no arguments. It will set the console to the logged *out* mode. The console may also be logged out by typing ***exit*** or ***ctrl-D***.

6.3.4 Label

Syntax: label [<word> *(no spaces)* | none]

The **label** command is only allowed when the unit is logged in.

This command enters a *label* that subsequently appears as part of the system console prompt. Labels can be any length. The word "**none**" deletes the label.

6.3.5 BANNER

Syntax: banner [edit]

The **banner** command is only allowed if the unit is logged in.

Using the **banner** command, a banner that consists of up to 9 lines can be entered. The banner is displayed when the **login** command is executed. When the login is performed by the administrator by specifying the password on the same line as the word login, the banner is displayed after the login. If the **login** command is used in prompted mode, the banner appears before the password prompt.

When the **banner** command is executed with no parameters, the entire banner is displayed, and then the DT-7000 administrator may re-enter an entirely new banner line-by-line or use the 'DEL' key to exit without altering the existing banner. The entire banner can also be displayed by typing **vfy banner.** See section 6.8.9.6 for more detail.

To change one or more lines of text in the banner, the administrator types **banner edit**. The entire banner is then displayed with line numbers. The user is prompted for which line to change. When the user enters a line number, the system displays the corresponding banner line and prompts for a replacement line. The user must then type in the entire text for that line followed by a newline (enter). The user is again prompted for a line number. When finished, the user types a new-line in response to the line number prompt.

The character set allowed for the banner is not restricted by the input rules of section 6.1. Any characters may be entered for the banner. The @, ****, and *backspace* characters be entered only by preceding them with ****.

6.3.6 DATE AND TIMEZONE

Syntax: date [hh:mm:ss] [mm/dd/yyyy]
timezone name=<zname> start=<zspec> STOP=<zspec>
timezone help

The **date** and **timezone** commands are only allowed when the unit is logged in.

The **date** command sets the system date and time. Without arguments the date command displays the current date and time settings. Since the DT-7000 does not have a battery backed-up timing device, it may lose time across system reboots.

The **timezone** command configures the parameters for the user's time zone, for proper display of the date and time. It is intended that time be kept internally according to "Universal Time" (formerly known as Greenwich Mean Time). The time zone should be administered so that the **date** command and all reports that might print dates (e.g. timestamps on files) can display local time while the system uses Universal Time. The **help** option of **timezone** prints a description of how to set the timezone (similar to the following).

The **name** parameter takes the form ***LBLhLBLh*** (for example NAME=PST8PDT7), where the first ***LBL*** is the 3-letter label that designates "standard time" in that time zone, and the second ***LBL*** designates "daylight savings", if any, in that time zone. The first and second ***"h"*** values designate the number of hours west of UTC for standard and daylight savings time, respectively. These numbers may be expressed in one of three forms:

n 'n' hours west of UTC (-n if east)

h:m 'h' hours and '*m*' minutes west of UTC (-h:m)

n.m 'n.m' hours (i.e. decimal fraction) west of UTC

The given example, name=PST8PDT7, would be used for Pacific Standard Time with daylight savings. When daylight savings is NOT to be used, just enter the same values for the first and second "*LBL*" and "*h*", e.g. name=PST8PST8.

The **start** and **stop** values give the date and time daylight savings starts and stops, according to the notation: *wDayMonTime*, where:

Day the day of the week ('Sun', 'Wed', etc.)

Mon the month

w which such 'Day' of the month (e.g. '1' for the first, etc., and '5' denotes "last")

Time h:m is the time to switch to the new mode

The rule for most U.S. time zones (and the *default* for START and STOP) is:

START=1SunApr2:00 STOP=5SunOct2:00

which declares that daylight savings starts on the first Sunday of April at 2 a.m. and ends on the last Sunday of October at 2 a.m.

6.3.7 CHANGE PASSWORD - CHGPASS

Syntax: chgpass old=<old> new=<new> confirm=<new>

The **chgpass** command is only allowed when the unit is logged in.

The **chgpass** command is used to change a user password on the system console. The command is only allowed if the user is logged *in*.

All three parameters can be given on the same line as the command. None of those entries are echo-suppressed. However, if parameters are omitted from the command line, the console will prompt for them, and the responses will be echo-suppressed. The keywords **passwd** and **newpass** can be used instead of **old** and **new**.

If the current password is valid and the two entries for the new password match, the password is changed to the new value.

6.3.8 RESET PASSWORD - RSTPASS

Syntax: rstpass

The **rstpass** command is always allowed.

The DT-7000 has a user changeable password that is used to gain access to the console. If the password should become misplaced, console access would not be available for configuration and administration. The user may recover from this situation using the **rstpass** command. This command is always available regardless of whether the console is logged in or not. The **rstpass** command displays unique identification about this particular device and then prompts for the key. The user may then contact Datatek Applications with that information to obtain the ***software key***. Note that the **software key** is also required to **register** the software before putting the module in service.

The ***software key*** is an eight character alphanumeric that is unique to this particular DT-7000 and software build number. If a valid key is entered, the user password is reset to the original value of ***initial***. If an invalid key is entered the message ***" Incorrect password"*** followed by

" * REPORT ALARM: Invalid Login Attempt " is generated (See all the alarms in Appendix B in section 9).

6.3.9 CONSOLE TIMEOUT – TIMEOUT

Syntax: timeout [<number of seconds> | off]

The **timeout** command is only allowed when the unit is logged in.

The DT-7000 serial console uses a three-wire interface (RD, TD, GND), and the lead state of other signals is not relevant. This would imply that the only way to change the state of the console is to explicitly log in or log out, or reboot which forces the console to be logged out.

For users who wish the console to automatically log off after a period of inactivity, there is a console timer. The console timer defaults to the disabled condition, and may be activated by the **timeout** command.

The **<number of seconds>** value must be between 30 and 1000, inclusive. To check what the present value is, key-in **timeout** without any arguments.

When the DT-7000 determines that the period of inactivity of the specified time has elapsed, it automatically forces the console to log off. An **INFO**-level alarm is issued at that time. (See Appendix B in section 9.)

6.4 SYSTEM PLATFORM CONFIGURATION – IP NETWORK RELATED COMMANDS

6.4.1 CLOSED USER GROUPS – CUG

Syntax: cug <cugnum> ipaddr=<d.d.d.d> submask=<IP submask>

The **cug** command is only allowed when the unit is logged in.

The **<cugnum>** parameter is the closed user group identifier used to assign the CUG to a virtual port (with the **vport** command), and may be a value between 1 and 32, inclusive. The CUG may also be assigned to the telnet console (with the **console** command), or the SNMP interface (with the **SNMP** command). If a vport is configured with one or more CUGs, only callers belonging to those CUGs are allowed to connect. If no CUG is assigned to a vport, any caller is allowed to connect. The same principle applies to callers to the telnet console or SNMP clients contacting the on-board SNMP agent.

Each CUG is specified by a single IP address and subnet mask pair. The **ipaddr** parameter is an IP address or the base address of an IP subnetwork that identifies members of the group. The caller's IP address *AND'ed* with the **submask** must agree with a CUG's **ipaddr** value *AND'ed* with the same **submask** value for the caller to belong to the CUG. Depending on the **submask** value, this allows an individual (submask=255.255.255.255), intermediate, or network-wide level of authorization.

Setting the **ipaddr** value to 0.0.0.0 deletes any prior configuration for the **<cugnum>**. A **<cugnum>** may not be deleted if it is currently assigned to any virtual port.

A list of all configured CUGs is reported via the **vfy cug** command. The list of closed user groups associated with a given virtual port is displayed as part of the **vfy vport** command. See section 6.8.9.10 for more detail.

6.4.2 CONSOLE ADMINISTRATION - CONSOLE

Syntax: console cug=[+|-]<cuglist> | cug=none

The **console** command is only allowed when the unit is logged in.

The **console** command is used to configure or change the closed user group configuration of the *telnet* console of the DT-7000. Up to 32 Closed User Groups (CUGs) may be associated with the telnet console. **CUG** values are separated by comma's with no embedded spaces. If the plus or minus sign precedes the **cug** list, that list of cug values is added or subtracted from the console's allowed cuglist. If neither the plus or minus sign precedes the **cug** number, the existing cuglist for the console, if any, is removed and the list is initialized with the value stated.

6.4.3 IP ADDRESS(ES) – IPADDR, SUBMASK, IPOTHER, IPPUBLIC

```
Syntax: ipaddr  [d.d.d.d] (IP address)
        submask [d.d.d.d] (subnet mask)
```

The **ipaddr, ipother, ippublic** and **submask** commands are only allowed when the unit is logged in.

The **ipaddr** field is the IP address of this unit.

The **submask** field is the subnet mask for the LAN segment on which the unit is located. It defaults to **255.255.255.0**.

The IP address and subnet mask are used to determine whether a destination IP address is on the same LAN segment, or if a gateway hop is required.

When one of these commands is invoked without its argument, it will display the current configuration of the unit. When invoked with its argument, the current configuration is changed accordingly.

When this DT-7000 is run in the high availability configuration as part of a duplex pair, two other IP addresses are required. The **ipaddr**, **ipother**, and **ippublic**, must be part of the same subnetwork as defined by the **submask**.

```
Syntax: ippublic [d.d.d.d]
        ipother [d.d.d.d]
```

The address **ipother** is the IP address of the other/companion DT-7000 in the pair. The address **ippublic** is the shared address of both units. Only one unit is active at a time.

Before configuring a pair of DT-7000s for high availability, they should each be configured with their own **ipaddr**, and with the appropriate **gateway**, and **submask**. *The two DT-7000's must be on the same network, which is to say the IP addresses of the two DT-7000s must have the same network ID.* See section 6.9 for additional detail and commands regarding the High Availability feature.

6.4.4 GATEWAY

```
Syntax: gateway [d.d.d.d]
```

The **gateway** command is only allowed when the unit is logged in.

The **[d.d.d.d]** field is the IP address of the gateway router to be used to reach a destination IP address on a different LAN segment. Invocation of the command with no arguments causes it to output the current value for **gateway**. The **gateway** must be in the same subnetwork as **ipaddr** as defined by the **submask**.

6.4.5 HOSTNAME

```
Syntax: hostname [<host.domain name> | none ]
```

The **hostname** command is only allowed when the unit is logged in. Invocation of the command with no arguments causes it to output the current value for **hostname**.

The DT-7000 is itself an IP entity. It has an IP address associated with it, and may also have a domain-style name. The ipaddr is specified by the **ipaddr** command described above. The **hostname**

can be a fully qualified name, **host.domain name**, or a simple name of 24 or less characters. The value **none** deletes any hostname previously defined.

After the hostname is input or changed, the DT-7000 must be rebooted in order for the name to become effective.

6.4.6 HOST NAMES - HOSTS

```
Syntax: hosts add|del IP=d.d.d.d name=<name> … name=<name>
        hosts del IP=d.d.d.d name=all
```

The **hosts** command is only allowed when the unit is logged in.

The **hosts** command is used to configure the hosts translation table.

The DT-7000 can maintain a set of domain-style mnemonic names for originating calls to the IP network, analogous to the /etc/hosts file on both UNIX and Microsoft Windows platforms. This allows the DT-7000 to perform a translation between a user-provided domain-style name and its associated IP address during call setup without using a DNS server. The use of a mnemonic name is optional; the DT-7000 will always accept an IP address in its base form. If the name is not present in the **hosts** table, then the resolution of the name to an IP address is attempted via the DNS servers specified in the **dns** command below.

The **name** parameter value is a mnemonic of 24 characters or less in length, using upper and lower case letters, digits, and the '-' (hyphen) and '.' (period) characters. Upper and lower letters are treated the same. That is, the name value is case insensitive. More than one name can have the same resultant IP address. When using the **del** option, the reserved value **all** can be used as the name value to delete all names associated with a particular IP address. If all names are deleted for an IP address, then the IP address is removed from the table as well.

The list of existing names in the hosts table can be obtained by running the commands **vfy hosts** or **hosts vfy**.

6.4.7 DOMAIN NAME SERVER - DNS

```
Syntax: dns [ name<n>=<name> ] [ ipaddr<n>=d.d.d.d ] (n=1,2,3)
```

The **dns** command is only allowed when the unit is logged in.

The **name1**, **name2**, and **name3** parameters are domain names. These domain names are appended to a domain-style name that is not fully specified for DNS purposes. For example, a name "bender.ho.lucent.com" is fully specified, so nothing is appended by the DT-7000. A name such as "bender" would need to have a domain appended before the DNS server could resolve it. The DT-7000 will append the specified domain names in the order of **name1** through **name3**, and send the resulting strings to the DNS server in succession until the latter is able to perform a resolution. The name can consist of upper and lower case letters, digits, and the '.' (period) character. The names are case insensitive and can be any length.

Each **ipaddr<n>** field is the IP address of a Domain Name Server to be used to resolve domain-style addresses not defined in the **hosts** table. The DNS IP addresses are used in the order specified. If only one address is to be defined, it should be **ipaddr1**.

Each time the **dns** command is run, the user is prompted for all values except for those specified on the command line. The user is prompted in the following order: **name1, name2, name3, ipaddr1, ipaddr2, ipaddr3.** In order to delete a value, reply to a prompt with the word "**none**" or on the command line, type the parameter name with no value following; for example,

`dns ipaddr1=` or `dns name2=`

6.5 SOFTWARE ADMINISTRATION COMMANDS

6.5.1 INSTALL

Syntax: install name=<filename> srv=<host> ID=<host login> pass=<host password> loc=<directory on host>

The **install** command is only allowed when the unit is logged in.

DT-7000 platform software may be upgraded using the **install** command.

Note: The software package files must first be placed on an FTP server accessible to the DT-7000.

The **install** command is invoked from either the RS-232C system or "telnet" console and accepts:

- The **name** parameter is a comma-separated list of platform software update filenames.
- The **srv** parameter is the IP address of the FTP server.
- The **id** parameter is the user id to be used on that FTP server.
- The **pass** parameter is the password associated with the user id on the FTP server
- The **loc** parameter is the location *(directory name if not /DT-7000/apps)* of the DT-7000 software files on the FTP server,

The **install** command will then operate as an FTP client to acquire the software files from the FTP server. Once the files have been acquired, the **install** command will disconnect from the FTP server, and unpack the software into its proper locations on the DT-7000. In doing so, the DT-7000 will display the *sum* of each platform update, which may be compared with the sum documented in the release notes for the DT-7000.

If parameters are omitted from the command line, **install** will prompt for them. When prompted for the password, the input is not echoed. Note that it is only necessary to specify **id** and **pass** when the FTP server is not a standard anonymous FTP.

The **install** command remembers the last **srv** and **loc** and provides them as defaults for the **srv** and **loc** prompts.

Platform upgrade filenames are always named ***base****xxxx*. Before performing an upgrade, users should study the installation procedures in the release notes for the given upgrade, because the order of installation and the sequence of rebooting between installation steps is ***very important***, and may be different from one release to the next.

6.5.2 SOFTWARE REGISTRATION – REGISTER

After installing a new software build and rebooting, before the DT-7000 may return to service, the software must be registered.

Syntax: register

Run the **register** command, which will produce the output similar to that shown below. Contact Datatek with the information in order to obtain the software key. Rerun the **register** command and enter the software key at the prompt.

```
<killie: DT-7000> register ↵
Product_Code=DT-7000
MAC=0.96.29.2.62.110
HW_SERNUM=0.0.8.9.179.188
Build_Number=3
```

```
Build_Date="Thu Jul 3 08:49:46 EDT 2003"
Enter key: ↵
No key entered
<killie: DT-7000>
```

6.5.3 BACKUP AND RETRIEVE CONFIGURATION DATA – BACK OR BACKUP, RETR OR RETRIEVE

The backup command **back** or **backup** uses **ftp** to send a package containing the entire configuration to the user's backup server. The retrieve command **retr** or **retrieve** causes the configuration to be reloaded onto the DT-7000 from the backup host.

```
Syntax: back | backup srv=<IP address of FTP host>
        [id=<Host Login ID>]
        [pass=<Host password >]
        [loc=<Path on FTP Server>]
        [file=<backup filename in host directory>]

Syntax: retr | retrieve all srv=<IP address of FTP host>
        [id=<HostLogin ID>]
        [pass=<Host password>]
        [loc=<Path on FTP Server>]
        [file=<backup filename in host directory>]
```

The IP address of the server may be given as a domain-style address if the DT-6X60 has been configured with a working **dns** or **hosts** configuration. The user may choose a unique name **<filename>** for **file.** The default name is ***bkup***. If the same file name is used for the **<filename>**, and a second backup is made to the same directory, the existing backup file name is renamed **<filename>.old**, and the new information is stored in **<filename>.**

The **back** and **retr** commands remember the previous **srv**, **loc**, and **file** values and provide them next time as defaults for the **srv**, **loc**, and **file** prompts.

*Note that the DT-7000 is automatically restarted when a **retrieve** is completed. That means all calls are taken down including a telnet to the console.*

6.5.4 VERSION – VER OR VERSION

```
Syntax: ver | version
```

The **ver**/**version** command is only allowed when the unit is logged in.

It displays the current software and database revisions of the unit. If the DT-7000 has been upgraded, and not yet rebooted; the version command will also display the version number of the software staged for operation.

6.6 REINITIALIZING THE DT-7000 - REBOOT

```
Syntax: reboot
```

The **reboot** command is only allowed when the unit is logged in.

After the DT-7000 is properly configured with system parameters, new software installed or retrieved, or a **switchover** from the active to the standby occurs (redundant DT-7000 operation), the DT-7000

must be reinitialized in order for the new values or software to take effect. This is performed with the **reboot** command.

The **reboot** command has no arguments. The **reboot** command is only allowed when the unit is logged in. After a reboot, the console is left in a *logged out* state. Also all calls in progress prior to the reboot are taken down.

A **reboot** must be performed from the system console after any values or software is changed using any of the following commands:

gateway, hostname, install, ipaddr, ipother, ippublic, stby, submask

A **switchover** automatically causes the *standby* to become *active* while the *current active* reboots and becomes the *new standby*. See section 6.9 for more detail

6.7 ENTITY DEFINITION COMMANDS

There are four classes of entities defined in the DT-7000. The list below shows each class and the command (in **bold** print) that is used to define an entity in that class:

1. Local host – **host** (The IP-CommKit host logically associated with this DT-7000)
2. Remote DT-7000's – **peer** (Other DT-7000's each of which has its own associated IP-CommKit host.)
3. Other Non IP-CommKit IP Network Endpoints, and Endpoints connected to a BNS node including IP-CommKit/CommKit hosts - **vport**
4. Miscellaneous Entities – SNMP Agent - **snmp**

6.7.1 LOCAL HOST ENTITY - HOST

```
Syntax:  host dest=<IP address>
              server=<DKname>
              area=<area> exch=<exchange>
              encrypt=<on|off>
         host delete
```

The **host** command is only allowed when the unit is logged in.

The **host** command configures the DT-7000 in order for it to be able to communicate with its associated host that is directly associated with this DT-7000. The IP-CommKit host itself must be configured in order to talk to its associated DT-7000.

The **dest** parameter is the IP address of the IP-CommKit host. This address can be specified as a numeric address of the form d.d.d.d. or as a domain-style name that is expanded via the **hosts** table or a domain name server into a numeric IP address.

The **server** parameter, **DKname**, value must be a *server name* specified on the connected IP-CommKit host. This value may be the same as the value returned when the command **uname –n** is executed on the host, although there is no requirement that it is.

The **area** and **exchange** names can each be up to 8 characters in length and consist of letters and digits. These names are case sensitive. The area and exchange names for all internetworking IP-CommKit hosts must be the same. If a BNS network existed, this would be the area code and exchange of the node to which the IP-CommKit host has been connected

The option, **encrypt=<on|off>**, allows the UTM traffic to be encrypted between the DT-7000 and its associated host. Both ends of the connection must have encryption enabled or disabled. The algorithm uses a dynamic random key method of data encryption when this option is enabled.

The **delete** option causes the removal of the configuration of the associated host on the DT-7000.

6.7.2 REMOTE DT-7000'S AND IP-COMMKIT HOSTS – PEERS

```
Syntax:  peer <peer#> dest=<IP address> server=<DKname> encrypt=<on|off>
         peer <peer#> delete
```

The **peer** command is only allowed when the unit is logged in.

A peer is a DT-7000 and its associated IP-CommKit host elsewhere in the network that interworks with the local DT-7000 and its associated IP-CommKit host. Hosts that are connected to the IP network and do not use IP-CommKit are not *peer*s. Hosts that are connected to the IP network and use IP-CommKit but connect only to a BNS node via a UTM module are not peers either. Both of these types of hosts are reached via other means described later.

The local DT-7000 can communicate with up to 64 other DT-7000's and hence their associated hosts. These remote DT-7000's are configured as peers 1 through 64. *Note that in the remote DT-7000's, this DT-7000 must also be configured as a peer in order to allow communication between the two.*

The value of the **dest** option is the IP address of the *DT-7000* to which the remote host is logically connected. *It is not the IP address of the remote IP-CommKit host.* This address can be specified as a numeric address of the form d.d.d.d. or as a domain-style name that ultimately is resolved into a numeric IP address via the **hosts** table or a dns server. The **vfy** command shows both the name and the resulting IP address. See **vfy peer** in section 6.8.9.9 below for more detail.

The **server** parameter value **DKname** must be a *server name* specified on the remote host. This value is usually the same as the value returned when the command **uname –n** is executed on that host.

The **encrypt=<on|off>** option allows the UTM traffic to be encrypted between this DT-7000 and its peer DT-7000's. Both ends of the connection must have encryption enabled or disabled. The algorithm uses a dynamic random key method of data encryption when this option is enabled.

The **delete** parameter causes the removal of a **peer#** from the list with which this DT-7000 will no longer be able to communicate.

6.7.3 OTHER REMOTE IP ENDPOINTS – VPORT

The **vport** command configures one or more virtual ports. It is through these vports that the IP-CommKit host associated with this DT-7000 communicates with endpoints that are not IP-CommKit hosts connected to remote DT-7000's. Examples of endpoints reached via vports are other IP hosts, which do not use IP-CommKit, ports on DT-4xxx's connected to network elements, DT-6xxx's, LAN-based PCs, and endpoints on a BNS network[5], which also includes CommKit and IP-CommKit hosts connected to a BNS network via CPM-HS or UTM modules, respectively.

```
Syntax: vport <vports*> [ type=rcv ] hport=<local TCP port>
                        cug=[-+]<cugnum>[,<cugnum>[,...]] [options]...
                  or-
        vport <vports*> [ type=orig ] dest=<IP addr> dport=<TCP port>
                        [options]...
                  or-
        vport <vports*> [ cnt=<#> ] delete
```

[5] The BNS network would have one or more UMI modules installed as its interface to the IP network. The vport on the DT-7000 would connect to a vport on the UMI in the BNS network that would in-turn connect through the BNS network to the endpoint on the BNS network.

```
where [options] are
        [ cnt=<#> ] [ incr=<#> ]  name=<name> svc=<service>
        prot=<raw|async|sync> data=<trans|7bit>  crfix=<trans|nonull>
        crlf=<trans|nolf>


  * Either a vport range or a vport and cnt=<#> may be given.
```

The virtual port command **vport** is only allowed when the unit is logged in.

A virtual port that waits for an incoming call from the IP network destined to the locally associated IP-CommKit host, is defined as **type=rcv**. A virtual port that originates calls from the locally associated IP-CommKit host to endpoints on the IP network is defined as **type=orig.** Up to 504 vports can be defined.

6.7.3.1 PARAMETERS FOR TYPE=ORIG PORTS

The associated IP-CommKit host can originate calls to originating vports **(type=orig)**. An example is a user logged in the IP-CommKit host and using the **dkcu** command.

The **name=<name>** value for **type=orig** defines the destination name by which the associated IP-CommKit host may reach this vport. More than one vport can have the same **name**, thus forming a hunt group. When a call from the associated host arrives, the vports in the hunt group are searched for a free port from the beginning of the list each time. <**Name>** is 8 characters or less long, and consist of digits and upper and lower case letters. No special characters are allowed.

For vports of **type=orig,** the **svc=<service>** option further qualifies this **vport** to be associated with the given **service.** When a call from the associated host specifies a service name, only those vports configured with the same service name or with **no** service name can accept the call.

The IP destination for a call must always be defined and is specified by **dest=<IP address>** and **dport=<TCP port>**. The **incr** parameter allows for multiple **dport** configurations from a single command. It is an increment added to the TCP port base value for each subsequent port specified in the **cnt** option. (See examples below.)

6.7.3.2 PARAMETERS FOR TYPE=RCV PORTS

When a virtual port is a call *receiver (listener)***(type=rcv),** a TCP port is specified via the **hport=<TCP port>** option. Multiple virtual ports may share the same TCP port value, to define a ***hunt group*** of virtual ports. A call that is coming from the IP network and is directed to this DT-7000 and this TCP port value would select the next available virtual port. Values of 1-5000 should not be used for **hport**.

The **cug=[+|-]<cugnum>[,<cugnum>]…** option allows the inclusion or deletion of a list of Closed User Groups (CUGs) in the list of CUGs that are currently assigned to the virtual port. The plus sign "**+**" will add the list of CUGs to the existing CUG list, if it exists. The minus sign "**-**" will delete the specified list of CUGs from the existing list. If neither the plus or minus sign is given, the current list of CUGs of this vport, if it exists, is deleted, and replaced by the list of CUGs specified

For **type=rcv,** the **<name>** value is passed to the IP-CommKit host in the BNS dialstring. <**Name>** is 8 characters or less long, and consist of digits and upper and lower case letters. No special characters are allowed.

For vports of **type=rcv**, the **svc=<service>** option specifies the name of the service to be supplied to the IP-CommKit host as part of the BNS call-setup dialstring. A typical service is "login". If **svc** is not specified and hence null in the DT-7000, the host upon input of the call to the host will use the default service specified in the host, if any.

6.7.3.3 PARAMETERS USED BY BOTH TYPES (ORIG AND RCV)

The value of **<vport #>** has a range of 1 through 504, inclusive, and represents the first virtual port to be affected by this command.

The **cnt** parameter allows more than one port to be affected. All virtual ports may be configured at once with a single command having a **cnt** of 504.

The **prot** option allows the specification of the encapsulation method associated with the virtual port. The **<async>** encapsulation method uses a ***telnet*** service without extensions. This is applicable to asynchronous connections. The **<sync>** encapsulation is basically the same as asynchronous, but with the extensions needed for synchronous protocols. The **<raw>** option is used when no encapsulation is desired. It should be noted that the DT-4xxx and DT-2020 series of products are tolerant of synchronous encapsulation for asynchronous connections, so virtual ports with these protocols may be grouped together for connections exclusively to endpoints on those devices.

The **crfix=< TRANS | NONULL >** option may only be specified if the protocol selected is **async.** It accommodates an anomaly in some early variants of *telnet* implementation on UNIX® systems, which insert a NULL character in the data stream after a carriage return. Most end devices are not affected by this NULL character. However, some devices (e.g. the BNS control computer) experience erroneous operation if these characters are received. The value **TRANS** indicates transparent operation, where all data received via a vport on the DT-7000 including a NULL after a carriage return, is forwarded to the end device. The value of **NONULL** removes a NULL character immediately following a carriage return. No other NULL characters are affected. The ***default*** operation is ***transparen*****t**.

The **crlf=< TRANS | NOLF >** option accommodates Microsoft MSDOS (and Windows variants) of telnet implementations. These implementations insert a LF character in the data stream after a carriage return. Since both characters are treated equally by some endpoints, the result is a double line entry where only one was desired. The BNS LCS60 device would always strip the LF following a CR. However, this would yield problems for some applications where transparency was desired. The **crlf** option allows the selection of either operation. When the **crlf=TRANS** is selected, the virtual port is transparent. When the **crlf=NOLF** is selected, the virtual port strips one LF following a CR for data sent to the associated IP-CommKit host.

The **data=<7bit | trans>** option allows the DT-7000 to "filter" data to 7 bit characters by essentially masking out the parity bit on each character. The **trans** parameter causes the data to be untouched. Some telnet clients will display garbage if the character size and parity is incorrect, and others will work fine. This feature will eliminate the issue altogether.

6.7.3.4 EXAMPLES USING THE *INCR* PARAMETER TOGETHER WITH THE *CNT* PARAMETER.

Described below are examples of the **vport** command when the **incr** and **cnt** parameters are used. The first example configures five vports (starting at vport 3) and increments the dport by a value of one. The second example configures three vports (starting at vport 22) and increments each subsequent dport by a value of 200.

Note: The "incr" option is used to configure the "dport" or "hport" options only.

Example 1

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```
<perch: DT-7000> vport 3 cnt=5 incr=1 dest=192.168.59.251 name=testname
dport=20000

<perch: DT-7000> vfy vport

    3-7 orig OOSvc name=testname dest=192.168.59.251 dport=20000
prot=async crfix=trans data=trans crlf=trans incr=1
```

Notice the **incr=1** in the **vfy** report above. This means that vports 3-7 are all the same except for the **dport** value that starts at value 20000 for port 3 and increments by 1 successively for vports 4, 5, 6, and 7.

```
<perch: DT-7000> vfy vport 7

      7 orig OOSvc name=testname dest=192.168.59.251 dport=20004
prot=async
            crfix=trans data=trans crlf=trans
```

If the **vfy** for a single vport is requested, even though it was defined using the **incr** option and part of a range of vports, the **incr** parameter is not shown, but the actual **dport** value for this port is shown.

Example 2

```
<perch: DT-7000> vport 22 cnt=3 incr=200 dest=195.234.41.3 dport=40000
name=testset3

<perch: DT-7000> vfy vport 22-24

  22-24 orig OOSvc name=testset3 dest=195.234.41.3 dport=40000 prot=async
            crfix=trans data=trans crlf=trans incr=200
<perch: DT-7000> vfy vport 24

     24 orig OOSvc name=testset3 dest=195.234.41.3 dport=40400 prot=async
            crfix=trans data=trans crlf=trans
```

6.7.4 MISCELLANEOUS ENTITIES – SNMP

```
Syntax: snmp get=<communities> set=<communities>
            trap=<community> dest=<IP address> cug=[+|-]<cuglist>
         (prompted: sysName=<esc> sysLoc=<esc> sysContact=<esc>)
        snmp vfy
```

The **snmp** command is only allowed when the unit is logged in.

The **snmp** command configures or verifies the parameters needed to permit the SNMP agent to communicate with a manager using closed user groups and user-specified communities for **get**s and **set**s. The DT-7000 will not respond to other community names. The **<communities>** parameter accepts a comma-separated list of community names. The communities configured for **set** also work for **get**, so they need not be repeated in the **get** parameter. The closed user group option **(cug)** defines which IP addresses are allowed to do **get**s and **set**s. Values are saved in non-volatile memory. There is only one **trap=<community>**. The **dest=<IP address>** parameter configures the IP address of the target trap manager. The **snmp vfy** command (same as **vfy snmp**) displays the current settings of SNMP configuration. (See the verify command **vfy** in section 6.8.9.3 for more detail.)

The **snmp** command prompts for all parameters not specified on the command line. Simply type **snmp** in order to add or change any parameters. If the present value that is printed is to be retained, hit newline in response to the prompt. In order to add to an existing list for the **set** and **get** communities, type in the old values as well as the additions for that parameter when prompted. To delete all values for a keyword, type the word "**none**" as the value. Special characters and escape sequences are accepted for community strings, **sysName**, **sysLoc**, and **sysContact** parameters, but must be entered at the prompt for that parameter, not on the command line.

When the SNMP configuration is changed, the agent is restarted. Whenever the DT-7000 reboots or the agent is restarted, a warm-start trap is sent to the configured trap manager. The only other trap sent by the DT-7000 platform agent is "authentication fail" when a manager attempts to use a community name not on the list. This trap is only sent if a manager has enabled it to be sent.

The snmp **sysName**, **sysLoc**, and **sysContact** are changeable via an SNMP manager as well as via the console.

The enterprise object ID of the DT-7000 is **1.3.6.1.4.1.3791.3.9**.

See Appendix C in section 10 for a listing of the available MIB variables and trap alarms.

6.8 RUN-TIME COMMANDS

6.8.1 DISPLAY CONNECTIONS – DCONN OR DC

```
Syntax: dc|dconn host [<channels> | all]
        dc peer <<peers> [<channels>]> | all
        dc vport [<vports> | all] | tcp [<tcpports> | all]
        dc net [-a] | pid [-a] [-f]
```

The display connections command, **dc or dconn**, is only allowed when the unit is logged in.

The DT-7000 may have hundreds of TCP connections and several UDP sessions with other IP endpoints. A list of these connections is reported by the **dc** (or **dconn**) command.

6.8.1.1 DT-7000 CONNECTION TYPES

Some knowledge of the internals of the DT-7000 is needed in order to better understand the reports described in later sections.

For each vport, the DT-7000 uses one TCP connection for each actively connected vport. Vports that are defined as **type=rcv** are known as *listener* ports, and use one TCP connection for each actively connected call and an additional TCP connection to listen for each unique hport.

There are a maximum of 64 peers numbered 1 through 64. There are two UDP ports used for communicating with all the peers. Port 51000 is used for keep-alives, and 51001 is used for data. For each peer, there is a TCP connection for exchange of signaling information with the remote DT-7000 and its associated host. TCP port 51002 is used to receive the signaling connections from other peers.

For the associated IP-CommKit host for this DT-7000, there are two UDP ports. The keep-alive messages are maintained on UDP port 49999 and the data on UDP port 50000. There is no TCP connection to the host.

There may be a TCP connection to telnet console.

Finally, there are two UDP ports for the built-in SNMP agent. (Ports 161 and 162)

See Appendix D in section 11 for a complete list of the TCP and UDP ports used in the DT-7000.

6.8.1.2 EXAMPLE – DC NET

The **dc net** command displays all active IP network connections. With the -a option, it also displays all listening ports and all open udp ports.

```
killie: DT-7000> dc net
Active Internet connections
Proto Recv-Q Send-Q  Local Address          Foreign Address        (state)
tcp        0      0  192.168.8.50.1023      192.168.1.25.46056 ESTABLISHED
tcp        0      0  192.168.8.50.1034      192.168.8.61.51002 ESTABLISHED
tcp        0      0  192.168.8.50.51002     192.168.7.25.2430  ESTABLISHED
tcp        0      0  192.168.8.50.51002     192.168.7.26.2159  ESTABLISHED
udp        0      0  192.168.8.50.49999     192.168.9.18.49999
udp        0      0  192.168.8.50.50000     192.168.9.18.50000
<killie: DT-7000> dc net -a
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address          Foreign Address        (state)
tcp        0      2  192.168.8.50.1023      192.168.1.25.46056 ESTABLISHED
tcp        0      0  192.168.8.50.1034      192.168.8.61.51002 ESTABLISHED
tcp        0      0  192.168.8.50.51002     192.168.7.25.2430  ESTABLISHED
tcp        0      0  192.168.8.50.51002     192.168.7.26.2159  ESTABLISHED
tcp        0      0  *.10010                *.*                    LISTEN
tcp        0      0  *.1024                 *.*                    LISTEN
tcp        0      0  *.12345                *.*                    LISTEN
tcp        0      0  *.223                  *.*                    LISTEN
tcp        0      0  *.23                   *.*                    LISTEN
tcp        0      0  *.51002                *.*                    LISTEN
udp        0      0  *.1025                 *.*
udp        0      0  *.161                  *.*
udp        0      0  *.51000                *.*
```

```
udp        0      0  *.51001                *.*
udp        0      0  *.65535                *.*
udp        0      0  *.9999                 *.*
udp        0      0  192.168.8.50.49999     192.168.9.18.49999
udp        0      0  192.168.8.50.50000     192.168.9.18.50000
```

In the above reports, “Recv-Q” and “Send-Q” indicate the number of bytes of IP data currently buffered for receive processing, or queued for transmission, respectively. The following are the possible TCP connection states:

BOUND	Bound to a local address, ready to connect or listen.
CLOSED	Closed. The socket is not being used.
CLOSING	Closed, then remote shutdown; awaiting acknowledgment.
CLOSE_WAIT	Remote shutdown; waiting for the socket to close.
ESTABLISHED	Connection has been established.
FIN_WAIT_1	Socket closed; shutting down connection.
FIN_WAIT_2	Socket closed; waiting for shutdown from remote.
IDLE	Idle, opened but not bound.
LAST_ACK	Remote shutdown, then closed; awaiting acknowledgment.
LISTEN	Listening for incoming connections.
SYN_RECEIVED	Initial synchronization of the connection underway.
SYN_SENT	Actively trying to establish connection.
TIME_WAIT	Wait after close for remote shutdown retransmission.

Table 6: TCP Connection States

The connections may also be viewed from an SNMP manager.

6.8.1.3 EXAMPLE – DC HOST

This report shows the connections between the 509 channels of the DT-7000’s associated host and the other endpoint, which could be a channel on a peer host or a vport on the “UMI” interface.

```
<DT-7000> dc host

Number of host channels active: 21
HOST  PEER|HOST|UMI       HOST  PEER|HOST|UMI       HOST  PEER|HOST|UMI
CHAN  CHAN|VPORT  STATE   CHAN  CHAN|VPORT  STATE   CHAN  CHAN|VPORT  STATE
----  ----------------    ----  ----------------    ----  ----------------
   2  (server)   WDIAL     189  Peer 64.13  TALK     199  Vport   151  TALK
 180  Peer 64.22  TALK     190  Peer 64.12  TALK
 181  Peer 64.21  TALK     191  Peer 64.11  TALK
 182  Peer 64.20  TALK     192  Peer 64.10  TALK
_183  Peer 64.19  TALK     193  Peer 64.9   TALK
 184  Peer 64.18  TALK     194  Peer 64.8   TALK
 185  Peer 64.17  TALK     195  Peer 64.7   TALK
```

```
 186 Peer 64.16  TALK     196 Peer 64.6   TALK
 187 Peer 64.15  TALK     197 Peer 64.5   TALK
_188 Peer 64.14  TALK     198 Peer 64.4   TALK
```

Here is a list of the DT-7000 call states used in this report and other reports described below:

AVAIL	Channel available
SRVI	Server channel is initializing
SERVE	Server channel is open
WDIAL	Dialstring expected from host
WOPEN	Dialstring received from host, waiting for UMI/peer channel
QOPEN	Caller gave up while waiting for UMI/peer channel
DIALO	Waiting for answer to an originated call
DIALR	Processing a received call
TALK	Call is active
ENDR	Processing a call takedown request
ENDO	Request was made for call takedown

Table 7: Call States

6.8.1.4 EXAMPLE – DC PEER ALL

```
<DT-7000> dc peer all
Number of peer channels connected: 10
 PEER    HOST          PEER    HOST
 #  CHAN CHAN STATE    #  CHAN CHAN STATE
 -- ---- ----------    -- ---- ----------
 64:   3  199 TALK     64:  8   194 TALK
 64:   4  198 TALK     64:  9   193 TALK
 64:   5  197 TALK     64:  10  192 TALK
 64:   6  196 TALK     64:  11  191 TALK
_64:   7  195 TALK     64:  12  190 TALK
```

6.8.1.5 EXAMPLE – DC VPORT

```
<DT-7000> dc vport
Vport 100: 31605 <= 192.168.7.26 2125 [host 511]
Vport 120: 31700 <= 192.168.7.25 1322 [host 510]
Vport 121: 31700 <= 192.168.7.25 1323 [DIALO]
Vport 150:  1322 => 192.168.7.25 31700 [host 3]
Vport 151:  1323 => 192.168.7.25 31700 [DIALR]
```

Outbound calls **(type=orig)** are indicated by the right arrow "=>". This vport is an originating port. The number immediately preceding the arrow is the TCP port number arbitrarily assigned by the sending DT-7000. The address to the right of the arrow is the **dest** and **dport** specified in the **vport** command.

Inbound calls **(type=rcv)** are indicated by the left arrow "<=". This vport is a listener port. The number immediately preceding the arrow is the TCP port number specified by the **hport** option in the **vport** command. The address to the right of the arrow is the caller's IP address and TCP port.

The information in **[**…**]** shows the host channel if the call is connected or the call processing status if the call is in transition.

6.8.1.6 EXAMPLE – DC TCP

The **dc tcp** command shows all **tcp** ports associated with vports and peers. The 'listening' ports show '*.*' instead of a foreign address.

```
<DT-7000> dc tcp
Peer   64:  1321 => 192.168.7.26 51002
Vport 100: 31605 <= 192.168.7.26 2125
Vport 120: 31700 <= 192.168.7.25 1322
Vport 121: 31700 <= 192.168.7.25 1323
Vport 150:  1322 => 192.168.7.25 31700
Vport 151:  1323 => 192.168.7.25 31700
 (peers)   51002 <= *.*
 (vports)  31602 <= *.*
 (vports)  31603 <= *.*
 (vports)  31606 <= *.*
 (vports)  31607 <= *.*
 (vports)  31608 <= *.*
 (vports)  31609 <= *.*
 (vports)  31620 <= *.*
 (vports)  31605 <= *.*
 (vports)  31605 <= *.*
 (vports)  31700 <= *.*
```

This report first shows the actual TCP connections, then all the listeners that are waiting for calls to come into this DT-7000 via the **vport** interface. The string "***.***" indicates an open listener associated with the indicated TCP port number. The TCP port number was defined in the **vport** command via the **hport** option for **type=rcv**. There may be several vports with the same **hport** value that are not connected. One listener process handles several vports with the same **hport** value. The occurrence of more than one listener entry with the same **hport** value indicates that the software assigned more than one listener process to this set of listeners.

6.8.1.7 EXAMPLE – DC PID

```
<killie: DT-7000> dc pid
Active Internet Connections by Applications (sorted by local address):
   Type  Indx  FD  Local Addr              Foreign Addr
   bicon 92    6   192.168.8.50.1023       192.168.1.25.35759
   callp 121   15  192.168.8.50.51002      192.168.7.25.3701
   callp 121   16  192.168.8.50.51002      192.168.7.26.3361
```

```
   callp 127   21  192.168.8.50.49999      192.168.9.18.49999
   callp 127   22  192.168.8.50.50000      192.168.9.18.50000

<killie: DT-7000> dc pid -a
Active Internet Connections by Applications (sorted by local address):
   Type  Indx  FD  Local Addr              Foreign Addr
   callp 118   15  0.0.0.0.1024           *.*
   callp 118   16  0.0.0.0.23             *.*
   callp 121   14  0.0.0.0.51002          *.*
   callp 122   15  0.0.0.0.12345          *.*
   callp 122   16  0.0.0.0.10010          *.*
   callp 123   15  0.0.0.0.223            *.*
   callp 127   19  0.0.0.0.51000          *.*
   callp 127   20  0.0.0.0.51001          *.*
   bicon 92    6   192.168.8.50.1023      192.168.1.25.35759
   callp 121   15  192.168.8.50.51002     192.168.7.25.3701
   callp 121   16  192.168.8.50.51002     192.168.7.26.3361
   callp 127   21  192.168.8.50.49999     192.168.9.18.49999
   callp 127   22  192.168.8.50.50000     192.168.9.18.50000

<dolphin: DT-7000> dc pid -f
Active Internet Connections by Applications (sorted by foreign address):
   Type  Indx  FD  Local Addr              Foreign Addr
   bicon 115   6   192.168.8.47.1023      192.168.1.25.43278
   callp 149   15  192.168.8.200.51002    192.168.7.26.3977
   callp 157   21  192.168.8.200.49999    192.168.8.60.49999
   callp 157   22  192.168.8.200.50000    192.168.8.60.50000
```

6.8.2 DISPLAY MEASUREMENTS – DM OR DMEAS

```
Syntax: dm | dmeas [-d ]  < ip | tcp | udp | icmp | eth >
            dm con  <all | peer <peers> | vport <vports> ]> [ clr ]
            dm utm  <all | host | peer <peers>] | vport> [ clr ]
```

The display measurements command, **dm** or **dmeas**, is only allowed when the unit is logged in.

The DT-7000 platform maintains measurements of network activity as an aggregate of all the types of interfaces. The measurements are grouped into three major categories: protocol, utm, and TCP connections. The measurements for any one of the categories may be reported by the **dm** command, giving one of the categories as a parameter. Section 12 (Appendix E) shows sample reports and information about individual measurements.

6.8.2.1 PROTOCOL MEASUREMENTS

The subcategories **ip**, **tcp**, **udp**, **icmp**, and **eth** for the protocols category report measurements for that protocol. The optional **-d** reports the differences between the current protocol measurements and

the previous results from **dm.** The protocol measurements cannot be cleared. These measurements may also be viewed from an SNMP manager.

6.8.2.2 TCP (CON) MEASUREMENTS – DM CON

The **con** report shows the current number of bytes received, sent, and discarded on the TCP connection for each peer or vport.

```
<DT-7000> dm con all

PEER:
 #  bytes Rcvd  bytes Sent  bytes dscd
 1         116         320           0
 2           0           0           0
VPORTS:
     bytes Rcvd  bytes Sent  bytes dscd
  4       31795         818           0
 89        3837          73           0
 90        7658         273           0
150         615       13297           0
```

The other requested VPORT measurements are all zero

6.8.2.3 UTM MEASUREMENTS – DM UTM

The **utm** measurements are reported for each of the UTM paths that carry Datakit-style (URP[6]) packets wrapped in the UTM trunk protocol. There are four sets of UTM paths:

- External
  1. The path to the host
  2. The paths to the peers
- Internal
  3. The path between the host interface software and the vport interface software
  4. The path between the host interface software and the call processing software

The **dmeas UTM** report has several columns:

Column Heading	Meaning
upkts Rcvd	The number of UTM packets received
upkts Sent	The number of UTM packets sent
DKpkt Rcvd	The number of Datakit-style (URP) packets received
DKpkt Sent	The number of Datakit-style (URP) packets sent
XFull	The number of times the UTM path became congested when attempting to transmit packets
Xdrop	The number of packets dropped when encountering congestion

[6] URP – Universal Receiver Protocol – The Lucent Technologies developed protocol used internally in a BNS/Datakit network between two endpoints.

Column Heading	Meaning
	while attempting to transmit.
Rdrop	The number of packets received on any (URP) channel that does not have a circuit (i.e. there is no call set up). These packets have nowhere to go, and are dropped.
Rbad	The number of UTM packets received that are not properly formatted.
rsGap	The number of times 'gaps' were detected in the sequence of UTM packets This is how the receive end of a UTM path can report the quality of the data path through the network from the far end. Such gaps could be because of congestion or corruption anywhere in the network, including the sender or receiver. Data dropped in transit over a UTM path is generally retransmitted under the auspices of the individual URP endpoints.

Table 8: DM UTM Report Column Heading Explanation

```
<perch: DT-7000> dm utm all

Host:
  upkts Rcvd upkts Sent DKpkt Rcvd DKpkt Sent XFull Xdrop Rdrop Rbad rsGap
       21238      28238      21238      28254     0     0     0    0     0
PEER:
# upkts Rcvd upkts Sent DKpkt Rcvd DKpkt Sent XFull Xdrop Rdrop Rbad rsGap
1          0          0          0          0     0     0     0    0     0
2          0          0          0          0     0     0     0    0     0
3          0          0          0          0     0     0     0    0     0
4          0          0          0          0     0     0     0    0     0
5          0          0          0          0     0     0     0    0     0
HOST->VPORTS:
 upkts Rcvd upkts Sent DKpkt Rcvd DKpkt Sent XFull Xdrop Rdrop  Rbad rsGap
          0          0          0          0     0     0     0     0     0
VPORTS->HOST:
 upkts Rcvd upkts Sent DKpkt Rcvd DKpkt Sent XFull Xdrop Rdrop  Rbad rsGap
          0          0          0          0     0     0     0     0     0

<DT-7000> dm utm peer 1-2 (This is just a subset of the above.)

PEER:
 # upkts Rcvd upkts Sent DKpkt Rcvd DKpkt Sent  XFull  Rdrop   Rbad  rsGap
 1          0          0          0          0     0     0     0     0
 2          0          0          0          0     0     0     0     0
```

6.8.2.4 CLEARING MEASUREMENTS

The protocol measurements cannot be cleared. As stated above, the optional **-d** value reports the differences between the current protocol measurements and the previous results from **dm.**

The **utm** and **con** measurement values are reset to zero via the clear option **clr**.

```
Syntax: dm con all clr
Syntax: dm utm all clr
```

6.8.3 PING

```
Syntax: ping [-c <count> |+c] <IP address>
```

The **ping** command is only allowed when the unit is logged in.

The **ping** command verifies connections to remote IP endpoints by sending three ICMP echo packets, one second apart, to the remote computer and listening for echo reply packets.

The IP address can use a domain-style address, providing the **dns** and/or **hosts** configuration has been properly entered or a numeric address.

The **–c <count>** option specifies the number of times the **ping** command is executed. It overrides the default of 3.

The +**c** option with no number means that the **ping** command executes indefinitely until the console user enters a **del** (delete) character in order to kill it.

6.8.4 REMOVE – RM, REM, OR REMOVE

```
Syntax: rm | remove | rem    host | peer <peers> | vport <vports> | mod
```

The remove command, **rm, rem,** or **remove**, is only allowed when the unit is logged in.

Removing the **host** or a **peer** from service disables all communication channels on that interface, both UDP and TCP. Removing a **vport** from service disables its TCP connection. Any calls in progress on the interface, if any, are taken down. Removing **mod** logically removes the host, peers, and vports in the DT-7000 from service. The individual peers, vports, and host that were in-service will now show ready-for-service or RFSvc and are not functional because the DT-7000 (**mod**) is out-of-service. Removing **mod** also forces the consoles to be logged out.

6.8.5 RESTORE – RS, RES, OR RESTORE

```
Syntax: rs | restore | res host | peer <peers> | vport <vports> | mod
```

The restore command, **rs, res,** or **restore**, is only allowed when the unit is logged in.

Restoring the **host** or a **peer** to service enables all communication channels on that interface both UDP and TCP. Restoring a **vport** to service enables its TCP connection. The interface is now ready to send or receive a call. Even though the individual peers, vports, and host show that they are in-service, they are not functional unless the DT-7000 (**mod**) is in-service. Restoring **mod** logically restores everything in the DT-7000 to service. However, an individual peer, vport, or the host may be still out-of-service. Only those that were ready-for-service or RFSvc will be restored to in-service. If the module has not yet been registered for the current software version, no components will be restored to service. Restoring **mod** also forces the consoles to be logged out.

6.8.6 RESTART

Syntax: restart

The **restart** command is only allowed when the unit is logged in.

This command restarts the software that communicates with the host, the peers, vports, and the console without rebooting. *However, all calls are taken down including a telnet call to the system console. All calls must be reestablished after the **restart** completes.*

6.8.7 SNOOP

Syntax: snoop [add | del] vport <all | vport-range> [nowait]
snoop [add | del] <host | cp> <all | chan-range> [nowait]
snoop off

The snoop command starts up a display of URP traffic (Universal Receiver Protocol, the Datakit native protocol). The display shows on the OA&M console unless the trace console is connected on TCP port **1024**, in which case the display appears on the trace console. (The trace console port does not accept any input commands.) Snooping of **host** URP shows all URP packets to or from the host in the given host channel range, whether from vports, peers, or internal call processing. Snooping of **cp** URP shows all URP packets to or from the call processing element of the DT-7000 in the given host channel range. Snooping of **vport** URP shows all packets to or from the vports in the given vport range. If all or a channel range is given without the **host**, **cp,** or **vport** keyword, URP packets are printed at all interfaces, i.e. generally twice.

When normal snooping is in progress, no other commands may be entered. Snooping is stopped by typing the **del** ('delete') key. When the trace port is connected, the **nowait** keyword may be used in the snoop command. This allows snooping to proceed on the (higher speed) trace console while the OA&M console returns to normal prompted command mode. Snooping may then be turned off by entering **snoop off** or by disconnecting the trace console. When snooping has been started in the **nowait** mode, channels or vports may be added to or deleted from the ongoing URP traffic display on the trace console by entering snoop with the **add** or **del** keyword followed by the desired channels or vports to add or delete from the trace display. The **nowait** keyword must be given to continue in the nowait mode, or the console will enter normal snooping mode.

Caution is advised: the snoop command makes heavy use of resources in the DT-7000 and in the network when there is a lot of URP traffic being traced.

6.8.8 TRACE ROUTE – TRACERT OR TRTE

Syntax: tracert | trte [-n | +n] <IP address>

The trace route command, **tracert** or **trte,** is only allowed when the unit is logged in.

The **trte** (or **tracert**) command determines the route taken to a destination by sending Internet Control Message Protocol (ICMP) echo packets with varying Time-To-Live (TTL) values to the destination. Each router along the path is required to decrement the TTL on a packet by at least 1 before forwarding it, so the TTL is effectively a hop count. When the TTL on a packet reaches 0, the router is supposed to send back an ICMP Time Exceeded message to the source system. **Tracert** determines the route by sending the first echo packet with a TTL of 1 and incrementing the TTL by 1 on each subsequent transmission until the target responds or the maximum TTL is reached. The route is determined by examining the ICMP Time Exceeded messages sent back by intermediate routers.

For each interim hop, three probes are sent and three round-trip times are printed on the output report. If there is no response within a 5-second timeout interval, a "*" is printed for that probe.

The **–n** and **+n** options govern DNS lookups. Normally for DNS, a name is resolved to a numeric IP address. Reverse lookup is then having a numeric IP address and looking up the name(s) associated with the numeric address. What happens with these options is dependent on what is specified for the **<IP address>**. If a numeric address is given for the **<IP address>**, **-n**, which is the default when a numeric IP address is given, means that the lookup of an IP address's name(s) is suppressed. Only IP addresses of the nodes/hops are shown in the **trte** output report. However, if a non-numeric address is given, i.e. a name is specified as the address, **-n** is not the default and would be specified if the numeric-address-to-name lookup were not wanted. The **+n** option means to ignore the default when a numeric address is given, lookup the name(s) corresponding to the numeric IP address, and show the names in the output report. When a non-numeric address is given, **+n** is the default, and means show the node/hop name(s) in the output report.

6.8.9 VERIFY - VFY

```
Syntax: vfy  mod | dns | snmp | hosts | console | banner
             host | vport [ <vports> | all ] | peer [ <peers> | all ] |
             cug [ <cugs> | all ] | stby
        vfymod
        console vfy
        dns vfy
        hosts vfy
        snmp vfy
        stby vfy
```

The verify command **vfy** is only allowed when the unit is logged in.

6.8.9.1 VERIFY MODULE – VFY MOD OR VFYMOD

The **vfy mod** (or **vfymod**) command shows the DT-7000's parameters and properties: module service state, local hostname (this DT-7000), console label (if any), the console CUG list, IP address, subnet mask, gateway IP address, redundant configuration, if any, MAC address, serial number, the software revision number, build date and time, and the elapsed time since the system was booted. If the console timeout has been set, the value will be shown.

If configuration changes are pending that require a reboot or if software installation has been started and not completed, **vfy mod** reports those conditions.

```
<killie: DT-7000> vfy mod
       Module is: In Service
        hostname: killie
           label: killie
console CUG list: 1,10,29
          ipaddr: 192.168.8.50
         submask: 255.255.255.0
         gateway: 192.168.8.1
        mac addr: 0.96.29.2.62.110
        serial #: 0.0.8.9.179.188
         build #: 3
        built on: Wed May 7 14:02:27 EDT 2003
          booted: 20 hour 58' ago
```

6.8.9.2 VERIFY DNS – VFY DNS OR DNS VFY

The **vfy dns** (or **dns vfy**) command shows the configuration that has been entered by the **dns** command. This consists of up to three domain names and up to three IP addresses. The domain names may be appended to an IP host name that is not fully specified for DNS purposes. The IP addresses represent DNS servers that are searched in the given order to resolve mnemonic addresses not defined in the **hosts** table.

```
killie: DT-7000> vfy dns
         domain name 1: datatekcorp.com
         domain name 2: dantest3
         domain name 3: (none configured)
 resolver 1 IP address: 192.168.1.15
 resolver 2 IP address: (none configured)
 resolver 3 IP address: (none configured)
```

6.8.9.3 VERIFY SNMP – VFY SNMP OR SNMP VFY

```
<killie: DT-7000> vfy snmp
             System name: killie
          System location: DTK-Bridgewater
     Contact information: bill
    GET-only communities: private,dan1,dan1a
     SET|GET communities: billb, dan3
          TRAP community: private
    TRAP manager address: 192.168.8.11
 SNMP Closed User Groups: (none configured)
```

6.8.9.4 VERIFY HOSTS – VFY HOSTS OR HOSTS VFY

The **hosts** table is used to resolve simple domain-style names into IP addresses.

```
<killie: DT-7000> vfy hosts
       127.0.0.1 localhost
   192.168.7.216 munich
    192.168.8.16 ipvcon
    192.168.9.28 LISBON lis2
    192.168.9.28 lis3
```

Note that multiple names can resolve to the same IP address. Note that names are not case sensitive.

6.8.9.5 VERIFY CONSOLE – VFY CONSOLE OR CONSOLE VFY

```
<killie: DT-7000> vfy console
  Console Closed User Groups: 1,10,29
```

6.8.9.6 VERIFY BANNER – VFY BANNER

```
<killie: DT-7000> vfy banner
this is line 1 of the banner
this is a new line 2
this is line3
this is line4
this is line5
this is line6
this is line7
this is line8
this is line9
<killie: DT-7000>
```

6.8.9.7 VERIFY HOST – VFY HOST

This is the locally associated IP-CommKit host for this DT-7000. The service state of the host, the keep-alive state (**alive or dead**), its IP address, area code and exchange name, the name of the server on the host, the encryption option, and the server channel state (call processing state) are shown.

```
vfy host

IP-CommKit host In Service, Alive. IP Addr: 192.168.9.18
  Area/Exch: nj/test/
    Server: london
    Encryption: OFF
  Server [london] channel 2 is alive
```

In order to have a totally functional host, the DT-7000 module must be in service, the host must be in service, the keep-alives must be active, and the server must be alive.

6.8.9.8 VERIFY VPORTS – VFY VPORT <VPORT#>

For this command for the **vport#** parameter, a numeric value, range, or the value "**all**" can be used. If no value is specified, the value defaults to "**all**".

Note that for **type=rcv** ports (See port 1 below), if a **service** was specified when the **vport** was defined, it is concatenated with the input name value. For parameters, like **dest** below for vport 2 **(type=orig)**, a simple **name** was specified for the **dest** value. This name was then translated to an IP address via the **hosts** table that is generated by the **hosts** command. Both the name and the resultant IP address are shown in the report.

```
killie: DT-7000> vfy vport all

      1 rcv InSvc name=vport1.pupu hport=12345 cug=none prot=async
            crfix=nonull data=trans crlf=trans
      2 orig InSvc name=vcon dest=ipvcon[192.168.8.16] dport=23 prot=async
            crfix=nonull data=trans crlf=trans
    3-4 orig InSvc name=luna3 dest=luna3[192.168.1.26] dport=23 prot=async
            crfix=nonull data=trans crlf=trans
```

```
      5 orig InSvc name=bender dest=bender[192.168.1.25] dport=23
prot=async
             crfix=nonull data=trans crlf=trans
      6 orig InSvc name=ipvcon dest=ipvcon[192.168.8.16] dport=23
prot=async
             crfix=trans data=trans crlf=trans
      7 orig OOSvc name=junk dest=junk[wait dns] dport=23 prot=async
             crfix=trans data=trans crlf=trans
      8 orig OOSvc name=luna3 dest=luna3[wait dns] dport=23 prot=async
             crfix=trans data=trans crlf=trans
     10 rcv OOSvc name=vport10 hport=10010 cug=1-2 prot=async crfix=nonull
             data=trans crlf=trans
  80-89 orig InSvc name=datakit dest=192.168.7.11 dport=2222 prot=async
             crfix=trans data=trans crlf=trans
  90-99 orig InSvc name=ubender dest=192.168.7.11 dport=23 prot=async
             crfix=trans data=trans crlf=trans
100-150 orig OOSvc name=bender dest=192.168.1.25 dport=23 prot=async
             crfix=nonull data=trans crlf=trans
151-195 rcv InSvc name=host hport=223 cug=none prot=async crfix=trans
             data=trans crlf=trans
```

When the IP address has not (or can not) be resolved from the domain-style name, the term "wait dns" appears instead of the IP address

6.8.9.9 VERIFY PEERS – VFY PEER <PEER#>

For this command for the **peer#** parameter, a numeric value, range, or the value "**all**" can be used. If no value is specified, the value defaults to "**all**".

The service state of the peer, keep-alive state (**alive or dead**), its IP address, the name of the server on the host, and the state and IP address of the TCP connection used for transmitting signaling information to the peer are shown.

```
<killie: DT-7000> vfy peer all

IP-CommKit peer 1 In Service, Alive. IP Addr: 192.168.8.51
      Names: exmunich
      Encryption: OFF
      TALKING ORIG port 2645 to 192.168.8.51/51002
IP-CommKit peer 2 Out of Service, IP Addr: 192.168.8.52
      Names: test2
      Encryption: OFF

<perch: DT-7000> vfy peer 5

IP-CommKit peer 5 Out of Service, IP Addr: host1[198.39.245.2]
```

```
      Names: newname
      Encryption: OFF
```

In the example below, suppose that DT-7000 *killie* at IP address 192.168.8.50 is a peer of DT-7000 *testcon5*. Host *london* is the associated host of (logically connected to) DT-7000 *killie*. The **vfy peer** report shows the state of the TCP connection 51002 between *killie* and *testcon5*, but nothing about the host connected to the remote DT-7000.

```
<testcon5: DT-7000> vfy peer 10

IP-CommKit peer 10 In Service, Alive. IP Addr: 192.168.8.50
      Names: London
      Encryption: OFF
      TALKING RECV at port 51002 from 192.168.8.50/3568

<killie: DT-7000> vfy host

IP-CommKit host Out of Service. IP Addr: 192.168.9.18
  Area/Exch: nj/test/
    Servers: London
    Encryption: OFF
```

Host *london* connected to DT-7000 *killie* is out-of-service but the TCP connection between DT-7000 *killie* and DT-7000 *testcon5* is up.

For peers there are also four items that must be functioning for peer communications: The DT-7000 module must be in service, the peer must be in service, the keep-alives must be active, and finally the TCP connection must be established.

6.8.9.10 VERIFY CLOSED USER GROUPS – VFY CUG <CUG#>

For this command for the **cug#** parameter, a numeric value, range, or the value "**all**" can be used. If no value is specified, the value defaults to "**all**".

```
<killie: DT-7000> vfy cug

cug  IP address       Subnet mask
  1  192.168.1.25     255.255.255.255
  2  192.168.8.0      255.255.255.0
```

6.8.9.11 VERIFY STANDBY – VFY STBY OR STBY VFY

This command **vfy stby** or **stby vfy** shows the standby DT-7000 status when a pair of DT-7000's are configured for redundancy.

```
<dolphin: DT-7000> vfy stby
```

```
Wed Dec 31 06:51:19 EST 2003
Standby was last seen "down" at Wed Dec 24 07:12:54 2003 EST
 stby cfg scan period in minutes: none
 stby cfg aging period in minutes: none
<dolphin: DT-7000>
```

6.8.10 DIAG COMMAND FAMILY - DIAG

Syntax: diag <subcommand> <parameters>

The **diag** command reports a variety of reports and statistics from the DT-7000 console and can aid in network monitoring and troubleshooting. **Diag** is provided at the <DT-7000> prompt, but is not currently displayed with the help command. Using the **diag** command with no recognized suboptions results in the message:

```
diag: Invalid command
```

Here are the various subcommands of **diag**:

6.8.10.1 ADDRESS – DIAG ADDRESS

Syntax: diag addr <IP address> <port>

The **addr** subcommand reports the instance associated with the supplied IP address and port. If the **<port>** parameter is **0**, all instances with ports associated with the supplied IP address are reported.

6.8.10.2 DEV – DIAG DEV

Syntax: diag dev *(use lower case)*

The **dev** subcommand reports *CPU* utilization and interrupt counts by category, including device drivers, processes, and scheduler (idle). The command prints utilization percentage and interrupt counts *since the last dev command*.

Sample Output

```
diag dev
*** IV ***
  con: 0          0% 89
  sch: 629        0% 121120
 sclk: 0          0% 113992
 eth0: 132        0% 8912
 SW+0: 127        0% 4682
 SW+1: 0          0% 5700
 SW+2: 0          0% 2280
 Sys:  1099    0%
 App:  3871       1%
sched: 407077    99%
```

Notes:

Each line represents a gross category of CPU usage. The numbers in each line are:

- total CPU time used (in 100'ths of seconds) since boot (can wrap around)

- percentage of available CPU time used since the previous 'diag dev'
- the count of events since the last 'diag dev'.

The most useful part of the report is the percentage (2nd number).

Category key:

con - arriving system console characters (very small)
sch & sclk - system scheduler clock ticks
eth0 - low-level handling of transmitted or received packets
SW+0,1,2 - handling IP traffic
sys - total system CPU time used by applications
app - total application CPU time
sched - idle time
(sys, app, and sched do not have event counts)

The elapsed time since the previous 'diag dev' can be derived from the 'sclk' category report; its event count represents clock ticks, or 1/100ths of seconds.

6.8.10.3 PING – DIAG PING

Syntax: diag ping
See section 6.8.3 for the **ping** command.

6.8.10.4 TRACERT – DIAG TRACERT OR DIAG TRTE

See section 6.8.8 for the **tracert** command.

6.8.10.5 URP – DIAG URP

Syntax: diag urp *(use lower case)*

This command reports rejects (REJs) and enquiries (ENQs) for groups of vports. A high number of ENQs and/or REJs may reflect difficulties in the IP network that require URP to perform error recovery.

```
killie: DT-7000> diag urp
M diag urp
              Rcvd: DKpkt     ENQ     REJ  Sent: DKpkt     ENQ     REJ
 Call proc:          8577       2       0          8587       0       0
VP   1-101:             0       0       0             0       0       0
VP 102-202:           490       0       0           362       0       0
VP 203-303:             0       0       0             0       0       0
VP 304-404:             0       0       0             0       0       0
VP 405-504:             0       0       0             0       0       0
```

6.9 HIGH AVAILABILITY OPTION

The High Availability option couples two DT-7000 modules as an ***active*** and a ***standby***. The ***active*** DT-7000 provides the communication between its host and the vports and peers, while the ***standby*** "stands by" and monitors the ***active*** DT-7000. If the ***active*** DT-7000 fails or loses power, the ***standby*** will shortly take over the ***active*** role.

In ***standby*** mode, the DT-7000 has completed system boot, but is not providing communications. A ***standby*** DT-7000 supports a subset of the commands in section 6, plus a small number of commands for support of high availability, documented later in this section. The prompt at the ***standby*** system console contains the word "standby".

Whenever a DT-7000 with high availability configuration boots, it first enters ***standby*** mode and begins to poll the other DT-7000 every few seconds across the IP network that joins them. There are three possible outcomes:

- The other DT-7000 doesn't respond (within a period of approximately 20 seconds), so this ***standby*** becomes ***active***.
- The other DT-7000 is already ***active***, so this ***standby*** updates its internal time-of-day from the ***active*** and continues to poll.
- The other DT-7000 is also in ***standby***, so a brief negotiation follows, and one of them becomes ***active***, while the other remains in ***standby***.

The ***standby*** periodically polls the ***active*** and also (optionally) updates its version of system software from the ***active***. If the ***active*** DT-7000 fails to respond to probes from the ***standby*** (for approximately 25 seconds), the ***standby*** takes over as ***active*** using its most recent version of system configuration.

When a ***standby*** takes over, all active connections to host, peers or vports that were established by the ***active*** are lost.

The ***active*** also tracks the status of the ***standby*** DT-7000, and remembers the most recent poll from the ***standby***. If polls from the ***standby*** are overdue, the ***active*** initiates polling at a low frequency.

The physical proximity of the two DT-7000's must be near enough on the LAN to provide a reasonably reliable connection between the two. On the other hand, it is wise to avoid having them on the same power line.

If the network connection between the ***active*** and ***standby*** is broken, the network becomes partitioned. The ***standby*** cannot receive responses from the ***active***, and thus the ***standby*** will take over as ***active*** (at least on the portion of the network where it remains connected). When the connection is reestablished, the two ***active***s soon see each other (because ***active***s initiate polling when the ***standby*** has not been seen) and respond to this impermissible situation by rebooting. Upon reboot, they negotiate to choose a new ***active*** and ***standby***.

Two new configuration objects are required for the high availability option: **ippublic** and **ipother**. When a DT-7000 is configured for high availability, the **vfy mod** command shows whether this DT-7000 is the ***active*** or ***standby***.

6.9.1 MODULE CONFIGURATION FOR HIGH AVAILABILITY – IPPUBLIC, IPOTHER

```
Syntax: ippublic <d.d.d.d>
        ipother <d.d.d.d>
```

Before configuring a pair of DT-7000s for high availability, they should each be configured with their own **ipaddr**, and with the appropriate **gateway**, and **submask**. The two DT-7000's must be on the same network, which is to say the IP addresses of the two DT-7000s must have the same network ID.

High availability configuration requires choosing a third IP address, **ippublic**, in the same network as the two DT-7000's. This *public* address is the one to be advertised to all other network elements that might be configured to interoperate with this DT-7000 pair. *High availability is enabled by configuring each DT-7000 with both **ipother** (the **ipaddr** of the other DT-7000) and **ippublic**.* Each DT-7000 must then be rebooted to enter high availability mode.

To *remove* the configuration for redundancy, set both **ippublic** and **ipother** to *none* for both DT-7000s, then reboot:

```
Syntax: ippublic none
        ipother none
```

6.9.2 Software Installation and Operational Configuration

Software installation (**install**) is performed as usual on the ***active*** DT-7000. The following describes how those operations are managed on the ***standby***.

6.9.2.1 System Software Installation - STBYUPD

The recommended procedure for installing new software is to use the **install** command on both the ***active*** and ***standby*** DT-7000. It doesn't matter which DT-7000 is updated first.

As an alternative, the ***standby*** may also receive newly installed software from the ***active*** DT-7000 by using the **stbyupd** command at the ***standby*** console:

```
Syntax: stbyupd os | sw
```

If the ***active*** has been updated with new software, **stbyupd os** should be performed on the ***standby***. In order for the **stbyupd os** command to work properly, the current time and date must be set properly using **date** and **timezone** [6.3.6] on the ***active*** controller. If it is not convenient or feasible to check and maintain the current time, then it is recommended to use **install** to keep the ***standby*** software in sync with the ***active***. The release notes for some platform updates *may* countermand use of **stbyupd os**, in which case the normal install procedures should be performed on the ***standby***.

6.9.2.2 Operational Configuration – STBYUPD CFG

After changing the configuration on the ***active***, the ***standby*** can have its configuration updated by entering **stbyupd cfg** on the ***standby*** console.

6.9.3 Automatic Standby Configuration Update – STBY CFG

The redundant pair of DT-7000's can be configured to perform a periodic automatic update of configuration from the ***active*** to the ***standby***. This is the most convenient way to propagate configuration changes from the ***active*** system into the ***standby*** DT-7000.

The update period is configurable by the user at the ***active*** system console:

```
Syntax: stby cfg SCAN=<minutes> AGE=<minutes>
        stby vfy
```

The **SCAN** period determines how often the ***standby*** polls the ***active***, and the **AGE** value determines how old files must be before they will be automatically copied to the ***standby***. Thus when the ***active*** fails and switches over, any configuration changes that were made in the last **AGE** minutes will not be present on the ***standby***.

On the ***active*** system console, the **vfy stby** (or **stby vfy**) command displays the current status of the ***standby*** DT-7000 and the configured values for **SCAN** and **AGE**.

As part of automatic configuration update, when the ***standby*** detects that the configuration on the ***active*** has changed, but the latest software is not resident on the ***standby***, it copies the software from the ***active***. This is the *only* case where software is automatically updated on the ***standby***. Otherwise, the procedures given in section 6.9.2 above must be performed in order to insure that the version of the application software used for a particular application is the same on the ***standby*** as it is on the ***active*** DT-7000

The **SCAN** procedure requires quite a bit of overhead on the ***active*** DT-7000, so it is recommended to make the **SCAN** period as long as the user's requirements will tolerate (e.g. 60 minutes). The **AGE** delay prevents potentially fault-inducing configuration changes from propagating to the ***standby***. If the ***active*** survives **AGE** minutes of operations with the new configuration, that configuration is propagated to the ***standby***.

It is not necessary to maintain the current time and date for automatic update to work properly. However, if **date** and **timezone** [6.3.6] are used, an improper setting could cause undue delays in automatic update. In particular, manually setting the date backwards by a large amount while an update is pending could cause an update delay of the same amount.

6.9.4 STANDBY LOGS – STBY DLOG, STBY RESET

Two new options have been added to the **stby** command: **dlog** and **reset**.

```
Syntax: stby dlog | reset
```

Two new logs are available on the **active** system which pertain to the **standby** system:

1. An alarm log showing the major alarms on the standby system
2. A standby activity log

The first log is viewed by entering any of the commands: **vfy stby**, **stby**, or **stby vfy**.

The second log is viewed by entering the command **stby dlog**.

Both logs are cleaned out and restarted by entering the command **stby reset**.

All of the above commands are executed on the ***active*** system.

6.9.5 SWITCHOVER

```
Syntax: switchover
```

The **switchover** command, available only at the ***active*** console, forces a switchover to the ***standby*** DT-7000. The former ***active*** DT-7000 then reboots into ***standby*** mode. The **reboot** command at the ***active*** console simply reboots the ***active*** DT-7000 back to ***active*** mode, while the ***standby*** DT-7000 allows a little extra time for the ***active*** to complete the **reboot**.

6.9.6 COMMANDS NOT AVAILABLE IN STANDBY MODE

The commands shown in the table below are not allowed at the ***standby*** console:

Section Number	Category of Disallowed Commands	Command List
6.3	**System Platform Configuration - Non IP Network Commands**	banner date timezone rstpass timeout
6.4	**System Platform Configuration - IP Network Commands**	cug console hosts dns
6.5	**Software Administration Commands**	backup retrieve
6.6	**System Reset Command**	
Entity Definition Commands		
6.7.1	Local Host Entity	host
6.7.2	Remote DT-7000's and Associated IP-CommKit Hosts	peer
6.7.3	Other Remote Endpoints	vport
6.7.4	Miscellaneous	snmp
Section Number	**Category of Disallowed Commands (Continued)**	**Command List**
6.8	**Run-Time Commands**	dc(partial) dm(partial) remove restore restart snoop vfy(partial)
6.9	**Duplex Operation**	switchover stby

Table 9: Disallowed Commands on Standby Processor

The **help** command at the ***standby*** console shows only the commands that *ARE* allowed. The **date** command at the ***standby*** console may not be used to change the date. As described above, the ***standby*** receives the current time from the ***active*****.**

7 CALL PROCESSING OVERVIEW

The description below provides a simplified high-level view of call processing internally in the DT-7000. The intent of this section is to provide the reader insight on how the various database values configured for the **host**, **peer**, and **vport** entities are used.

7.1 INBOUND CALLS VIA VPORTS

For each call from an IP endpoint to a DT-7000 receive (**type=rcv**) vport, the DT-7000 constructs a Datakit call-setup message to send to the associated IP-CommKit host.

Messages have both a "to" (destination) part and a "from" part and are constructed by the DT-7000 using information defined in the configuration database.

To: **host_server_name [.vport_service]**

Where

Host_server_name is defined in the **host** command as the **<DKname>** value of the **server** parameter.

Vport_service is defined in the **vport** command as the service specified on the incoming **type=rcv** vport as the **<service>** value of the **svc** parameter. The default is no service (null) which would then cause a login prompt from the host.

From: **vport_name**

Where

Vport_name is defined in the **vport** command as the name specified by the **<name>** value of the **name** parameter.

Security information that is normally present in host-to-host or BNS/Datakit endpoint-to-host calls is not present in vport-to-host calls.

7.2 OUTBOUND CALLS

Calls originated by the IP-CommKit host are translated by the DT-7000 into three possible outbound call scenarios described below. The higher level host software (application) works the same regardless of whether it is physically connected to a BNS/Datakit node either by fiber or ethernet or to a DT-7000. The dialstring format from the host is the same as that used by traditional BNS/Datakit. The DT-7000 looks like a node to the IP-CommKit host. The dialstring carries user-id and other security information that can be interpreted by other IP-CommKit hosts.

Messages originated by a host can have one of three possible destinations managed by the DT-7000:

1) back to the host itself
2) to a peer
3) to a vport (i.e. to an IP destination.)

Again the message has both a "to" part and a "from" part.

To: **name [.service]**

Where

Name is checked in the following order:

1) Is **name** the same as the **server** name **<DKname>** specified in the **host** command for the associated host itself? If so, send the dialstring back for processing by the host, just as a

BNS/Datakit controller would. The dialstring carries all the addressing and security information used in BNS/Datakit call processing. When the host responds, the DT-7000 replies back to the original call from the host.

2) If not, check if it matches the **server** name **<DKname>** defined in the **peer** command for one of the peers? If so, send the dialstring to the corresponding peer (using the TCP signaling channel which is TCP port 51002) The dialstring contains the destination and the service desired by the host and other security information and parameters normally carried in BNS/Datakit call processing. When the peer responds, the DT-7000 responds back to the host call.

3) If the **name** does not match the first two categories, check if it matches the **<name>** of one of the vports defined as **(type=orig**). Note that more than one vport can have the same value for **name**. If the values match, find the next free vport that has the same service (**svc=<service>**) specified. More than one vport with the same **<name>** can have the same **<service>** specified. When a match is found, set up a call to the **<IP addr>** and **<TCP Port>** defined by the **vport** command's **dest** and **dport** parameters. Security information cannot be forwarded to **vport**s. When the TCP connection completes, then the DT-7000 responds back to the host.

7.3 INBOUND CALLS FROM PEERS

When a dialstring arrives from a peer, the DT-7000 checks that the destination matches the configuration of the host server name and forwards the call to its associated host. The service name, security information, and other parameters are forwarded. When the host responds to the call, the DT-7000 replies to the peer.

8 APPENDIX A: CONSOLE CABLE - SPECIAL WIRING DIAGRAMS

8.1 CONSOLE CABLE SPECIAL WIRING

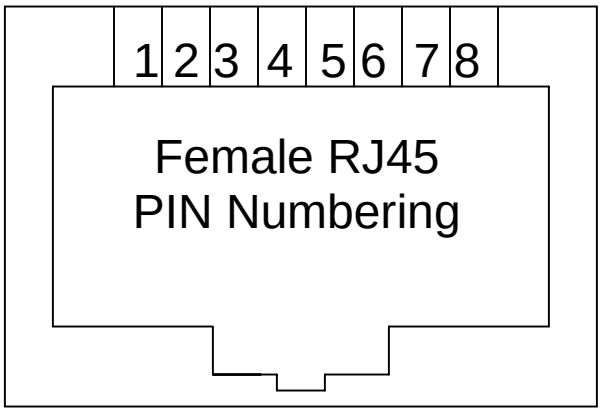
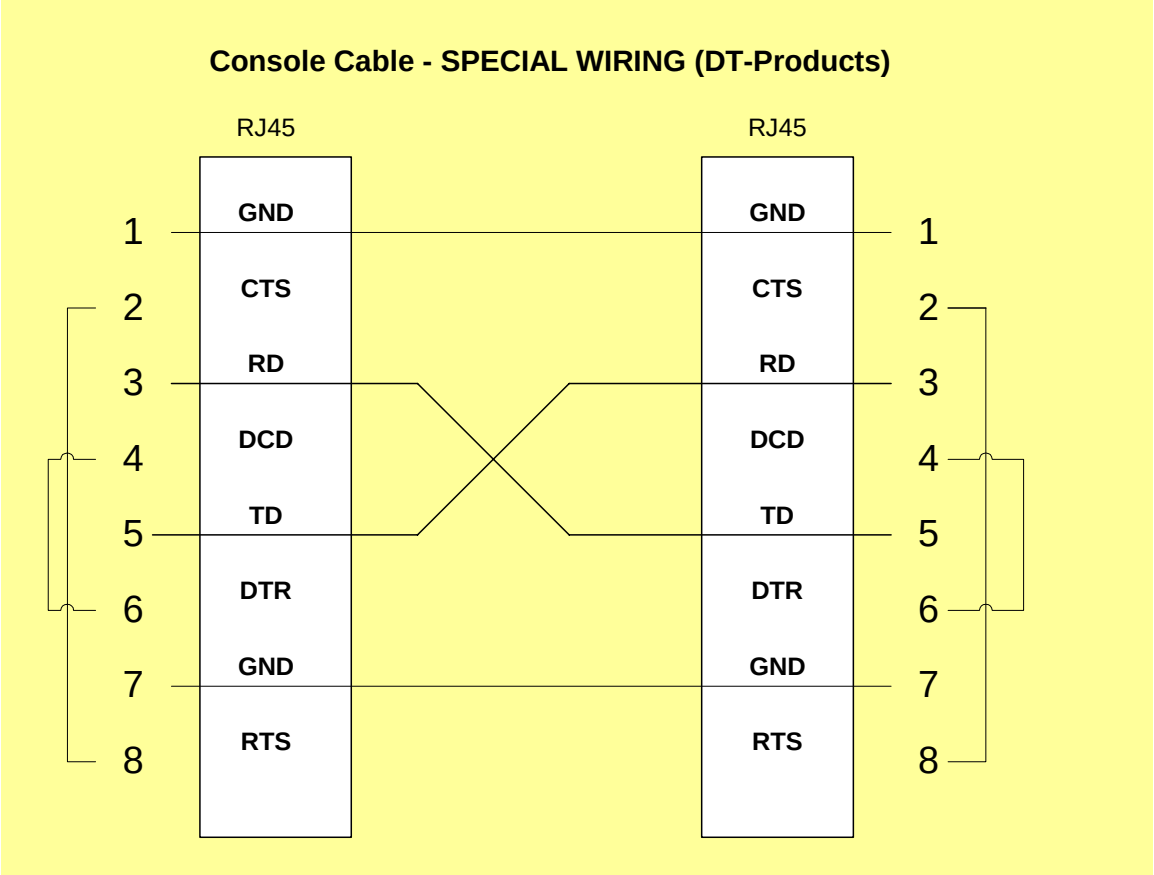


Figure 7: Console Receptacle Pin Assigment

Figure 8: Special Wiring for Console Modular Cable

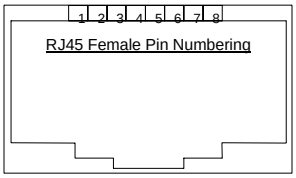


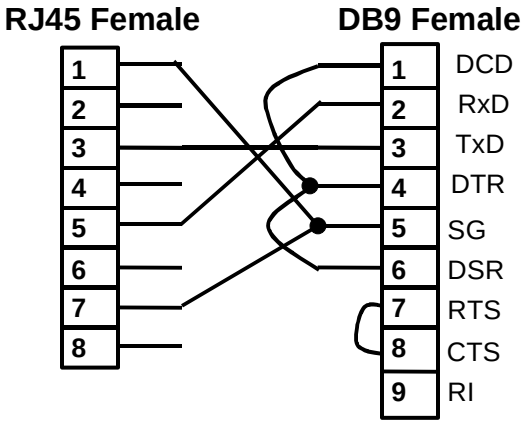
8.2 THE DB9 CONSOLE ADAPTER

Some Personal Computers use a 9-pin DB9 interface for serial communications. The terminal emulation programs may require certain lead status. Since console connections are generally implemented as three wire interfaces (i.e. RxD, TxD, and SG); this may pose a problem for the terminal emulation programs.

Below is depicted the wiring of a DB9 adapter which eliminates the problems associated with these terminal emulation programs. It is used with a standard **straight** category 5 RJ45 cable.

DB9 Async DCE Console Adapter





Note: This cable for use on console ports only.

Use with a straight CAT-5 RJ45 cable.

Figure 9: 9-Pin Console Adapter Wiring Diagram

9 APPENDIX B: ALARMS

The table below shows the alarms out put on both the serial console and telnet console (TCP port 1023. There are three severity levels of alarms in decreasing severity order: major, minor, and informational.

- Major Alarms - A major alarm indicates a serious, service-degrading condition.
- Minor Alarms - A minor alarm indicates a secondary or transient error that is not likely to affect overall service unless multiple minor alarms are issued. In this case, a serious condition exists that may affect overall system performance
- Info Alarms - An information alarm is a message that does not necessarily require attention. It typically is important for network administration, but does not adversely affect service.

When an alarm is output to the consoles, the actual text for major and minor alarms is preceded by a double asterisk or single asterisk and blank respectively and the words “REPORT ALARM”. The actual text for an Informational alarms is preceded by two blanks and the words “REPORT ALARM”, “REPORT STATUS”, etc. Here is the current list of alarms and their text for systems not run in duplex mode.

Table 10: Alarms Severity and Text (Simplex Systems)

Severity	Alarm Text
MAJOR	<peer or host> is not responding
MAJOR	Encryption <on/off> mismatched for <host/peer#>
MINOR	<uid> <mtype> msg corrupted[%d bad]
MINOR	<uid> <mtype> msg truncated[%d bad]
MINOR	<utm path>: <utm packet format error>[<num> bad]
MINOR	Attempted connection to <console port> from <IP addr>,not in any CUG
MINOR	Attempted connection to System Console from <IP addr>
MINOR	CSC channel full, <num> messages dropped
MINOR	CSC channel full, message dropped
MINOR	Cug database error: <system error message>
MINOR	Host configuration mismatch: server name from host is '<server>'
MINOR	Host is running Ver <vernum> not 4
MINOR	internet name '<name>' not found for <peer or host>
MINOR	internet name '<name>' not found for vport <num>
MINOR	Invalid Login Attempt
MINOR	Invalid password change attempt
MINOR	Keep-alive from unrecognized <host/peer> addr <IP addr> <port>
MINOR	Module is out of service

Severity	Alarm Text
MINOR	Peer <pnum> configured server name (<server> not present
MINOR	Peer <pnum> reported [server or area/exch] (<area/exch|server> doesn't match configuration [configured]
MINOR	Peer connection from unrecognized address <IP addr> rejected
MINOR	Peer connection from unrecognized address <IP addr> rejected
MINOR	Server channel <num> has gone down
INFO	Connection with <peer or host> has been established
INFO	Console session inactivity timeout
INFO	Data from unrecognized addr <IP addr>
INFO	Keep-alive message sequence# mismatch from <host/peer#>: expected <num>, received <num>
INFO	Server channel <num> [<server>] is alive
INFO	Snooping turned off
INFO	Warning: DNS resolution took <sec> seconds

For redundant systems only, there are additional alarms that are shown in the table below:

Table 11: Additional Alarms - Severity and Text (Duplex Systems)

Severity	Alarm Text
MAJOR	Rebooting in 30 seconds
MAJOR	The active DT-7000 at <IP addr> is not the expected <IP addr>
MAJOR	This DT-7000 has been only partially configured for redundant operation. Fix configuration and reboot.
MINOR	Can't access active DT-7000 temp files
MINOR	Can't find update file server
MINOR	File updates took too long; quitting
MINOR	We don't have access to the active DT-7000

10 APPENDIX C: SNMP MIB VARIABLE DATABASE AND TRAPS

The DT-7000 SNMP V1 agent supports a multitude of SNMP MIB variables accessible by **get** and **set** operations and SNMP ***trap*** operations,

One or more SNMP managers may query the SNMP agent.

Command	Operational Result
Get	Requests the values of one or more Management Information Base (MIB) variables.
GetNext	Enables MIB variables to be read sequentially, one variable at a time.
Set	Permits one or more MIB values to be updated.
GetResponse	Used to respond to a Get, GetNext, or Set.
Trap	Indicates the occurrence of a predefined condition.

Table 12: SNMP Commands and Action

10.1 SNMP MIB VARIABLE DATABASE

RO = Read Only Variable
R/W = Read Variable / Write Variable
SIV = Storage is Volatile (this applies to enableAuthenTraps

Table 13: SNMP MIB-II Variables

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.1.1.0	SysDescr	MIB-II	Banner Message	RO	
1.3.6.1.2.1.1.2.0	SysObjectID	MIB-II	None	RO	
1.3.6.1.2.1.1.3.0	SysUpTime	MIB-II	None	RO	
1.3.6.1.2.1.1.4.0	SysContact	MIB-II	None	R/W	
1.3.6.1.2.1.1.5.0	SysName	MIB-II	None	R/W	
1.3.6.1.2.1.1.6.0	SysLocation	MIB-II	None	R/W	
1.3.6.1.2.1.1.7.0	SysServices	MIB-II	None	RO	
1.3.6.1.2.1.4.1.0	IpForwarding	MIB-II	None	RO	
1.3.6.1.2.1.4.2.0	IpDefaultTTL	MIB-II	None	RO	
1.3.6.1.2.1.4.3.0	IpInReceives	MIB-II	Nbr of Ethernet Pkts Rcvd	RO	
1.3.6.1.2.1.4.4.0	IpInHdrErrors	MIB-II	Nbr of Packets w/Header Errs	RO	
1.3.6.1.2.1.4.5.0	IpInAddrErrors	MIB-II	Nbr Rx Packets w/Wrong Addr	RO	

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.4.6.0	IpForwDatagrams	MIB-II	None	RO	
1.3.6.1.2.1.4.7.0	IpInUnknownProtos	MIB-II	Nbr of Packets w/Unk Protocol	RO	
1.3.6.1.2.1.4.8.0	IpInDiscards	MIB-II	Nbr of Packets Disc due to Resource	RO	
1.3.6.1.2.1.4.9.0	IpInDelivers	MIB-II	Inferred from DMEAS counters	RO	
1.3.6.1.2.1.4.10.0	IpOutRequests	MIB-II	Nbr of Device Frames Transmitted	RO	
1.3.6.1.2.1.4.11.0	IpOutDiscards	MIB-II	Nbr of Port frames Disc due to Resource	RO	
1.3.6.1.2.1.4.12.0	IpOutNoRoutes	MIB-II	None	RO	
1.3.6.1.2.1.4.13.0	IpReasmTimeout	MIB-II	None	RO	
1.3.6.1.2.1.4.14.0	IpReasmReqds	MIB-II	None	RO	
1.3.6.1.2.1.4.15.0	IpReasmOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.16.0	IpReasmFails	MIB-II	None	RO	
1.3.6.1.2.1.4.17.0	IpFragOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.18.0	IpFragFails	MIB-II	None	RO	
1.3.6.1.2.1.4.19.0	IpFragCreates	MIB-II	None	RO	
1.3.6.1.2.1.4.21.0	IpRoutingDiscards	MIB-II	None	RO	
1.3.6.1.2.1.5.1.0	IcmpInMsgs	MIB-II	None	RO	
1.3.6.1.2.1.5.2.0	IcmpInErrors	MIB-II	ICMP Errors	RO	
1.3.6.1.2.1.5.3.0	IcmpInDestUnreach	MIB-II	None	RO	
1.3.6.1.2.1.5.8.0	IcmpInEchos	MIB-II	Nbr of Pings	RO	
1.3.6.1.2.1.5.9.0	IcmpInEchoReps	MIB-II	None	RO	
1.3.6.1.2.1.6.1.0	TcpRtoAlgorithm	MIB-II	None	RO	
1.3.6.1.2.1.6.2.0	TcpRtoMin	MIB-II	None	RO	
1.3.6.1.2.1.6.3.0	TcpRtoMax	MIB-II	None	RO	
1.3.6.1.2.1.6.4.0	TcpMaxConn	MIB-II	None	RO	
1.3.6.1.2.1.6.5.0	TcpActiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.6.0	TcpPassiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.7.0	TcpAttemptFails	MIB-II	None	RO	
1.3.6.1.2.1.6.8.0	TcpEstabResets	MIB-II	None	RO	
1.3.6.1.2.1.6.9.0	TcpCurrEstab	MIB-II	None	RO	

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.6.10.0	TcpInSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.11.0	TcpOutSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.12.0	TcpRetransSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.13.X	TcpConnTable Entries	MIB-II	None	RO	
1.3.6.1.2.1.6.14.0	TcpInErrs	MIB-II	None	RO	
1.3.6.1.2.1.6.15.0	TcpOutRsts	MIB-II	None	RO	
1.3.6.1.2.1.7.1.0	UdpInDatagrams	MIB-II	Derived from other Counts.	RO	
1.3.6.1.2.1.7.2.0	UdpNoPorts	MIB-II	Non-Peer and Spurious UDP errors	RO	
1.3.6.1.2.1.7.3.0	UdpInErrors	MIB-II	Frame Errors	RO	
1.3.6.1.2.1.7.4.0	UdpOutDatagrams	MIB-II	Frames Sent, Keep Alive Messages sent, etc.	RO	
1.3.6.1.2.1.7.5.X	udpEntry Table	MIB-II	None	RO	
1.3.6.1.2.1.11.1.0	SnmpInPkts	MIB-II	None	RO	
1.3.6.1.2.1.11.3.0	SnmpInBadVersions	MIB-II	None	RO	
1.3.6.1.2.1.11.4.0	SnmpInBadCommunityNames	MIB-II	None	RO	
1.3.6.1.2.1.11.5.0	SnmpInBadCommunityUses	MIB-II	None	RO	
1.3.6.1.2.1.11.6.0	SnmpInASNParseErrs	MIB-II	None	RO	
1.3.6.1.2.1.11.30.0	SnmpEnableAuthenTraps	MIB-II	None	R/W	
1.3.6.1.2.1.11.31.0	SnmpSilentDrops	MIB-II	None	RO	
1.3.6.1.2.1.11.32.0	SnmpProxyDrops	MIB-II	None	RO	

The enterprise object ID of the DT-7000 is **1.3.6.1.4.1.3791.3.9**.

10.2 SUPPORTED TRAPS

Alarm Text	Severity	Trap Type	Notes
None	N/A	WarmStart	Generated when the unit reboots or restarts
None	N/A	AuthFail	SNMP Authorization Failure

Table 14: Supported SNMP Traps

11 APPENDIX D: TCP/UDP PORT NUMBERS

The DT-7000 uses the following TCP and UDP ports. These ports cannot be changed by configuring them.

Table 15: TCP/UDP Port Numbers Used

Protocol	Port Number	Purpose
UDP	161	Used by SNMP managers to set MIB values or get MIB data from the DT-7000
UDP	162	Used by the DT-7000 SNMP agent for sending Traps to the designated SNMP manager
TCP	23	Old telnet console port. If a call is attempted to this port, the call is answered, the banner displayed, and the call is then disconnected.
TCP	1023	The telnet console port which also shadows the RS-232 serial console port
TCP	1024	A diagnostic output port for trace messages only
TCP	1025-5000	Ports dynamically assigned by the DT-7000 for outgoing calls. Do ***NOT*** use or assign these ports.
UDP	9998	Active/Standby communication port
UDP	9999	DTproduct - obsolete
UDP	49999	The port used for sending 'keep-alive" messages between the DT-7000 and the associated host (It is used with the IP address configured in the **host** command.)
UDP	50000	The data port used for sending data messages between the associated host and the DT-7000
UDP	51000	The port used for sending 'keep-alive" messages between the DT-7000 and other DT-7000's (It is used with the IP address configured in the **peer** command.)
UDP	51001	The data port used for sending data messages between this DT-7000 and other DT-7000's (It is used with the IP address configured in the **peer** command.)
TCP	51002	The signaling port for receiving call connection information from other DT-7000's. (It is used with the IP address configured in the **peer** command.)
TCP	Various	Ports as configured in the **vport** command by the DT-7000 administrator for **type=rcv** for **hport** (inbound hunt groups) or for **type=orig,** the **dport** (outbound destination or hunt groups)
TCP	Various	TCP ports dynamically allocated by the DT-7000 for connection to other DT-7000's or to vports

12 APPENDIX E: THE DISPLAY MEASUREMENTS (DM|DMEAS) REPORT

The DT-7000 platform maintains measurements of network activity as an aggregate of all the application instances. The measurements are grouped into five subcategories of the protocols: **ip**, **tcp**, **udp**, **icmp**, and **eth**. Many of these measurements are related to variables included in MIB II - Management Information Base for Network Management of TCP/IP-based Internets (RFC1213).

In the following report samples, the identifiers indicated in red have been added to reference individual measurements. Information is then provided (in some cases from RFC1213) to describe each measurement. Measurements that do not have identifiers (mainly in the TCP section) are those that would be helpful only to developers who are diagnosing problems, but would not be useful to end users on their own.

Please note that the measurements shown in the following report samples may not be representative of any particular customer's installation; i.e., the presence of 0's (or non-0's) is not necessarily an indication of what should be expected.

12.1 IP

12.1.1 SAMPLE REPORT – DM IP

```
<DT-7000> dm ip

ip:
IP 1   2488798 total packets received
IP 2   0 bad header checksums
IP 2   0 with size smaller than minimum
IP 2   0 with data size < data length
IP 2   0 with header length < data size
IP 2   0 with data length < header length
IP 2   0 with bad options
IP 2   0 with incorrect version number
IP 3   0 fragments received
IP 4   0 fragments dropped (dup or out of space)
IP 4   0 fragments dropped after timeout
IP 5   0 packets reassembled ok
IP 6   2414429 packets for this host
IP 7   74369 packets for unknown/unsupported protocol
IP 8   0 packets forwarded
IP 9   0 packets not forwardable
       0 redirects sent
IP 10  2186773 packets sent from this host
       0 packets sent with fabricated ip header
IP 11  0 output packets dropped due to no bufs, etc.
```

```
IP 12  0 output packets discarded due to no route
IP 13  0 output datagrams fragmented
IP 14  0 fragments created
IP 15  0 datagrams that can't be fragmented
```

12.1.2 MEASUREMENT DESCRIPTIONS - DM IP

IP 1: The total number of input datagrams received from interfaces, including those received in error.

IP 2: The number of input datagrams discarded due to errors in their IP headers, broken down by bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, etc.

IP 3: The number of IP fragments received which needed to be reassembled at this entity.

IP 4: The number of failures detected by the IP re-assembly algorithm (for whatever reason: timed out, errors, etc).

IP 5: The number of IP datagrams successfully re-assembled.

IP 6: The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).

IP 7: The number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.

IP 8: The number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities that do not act as IP Gateways, this counter will include only those packets that were Source-Routed via this entity, and the Source-Route option processing was successful.

IP 9: The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (e.g., 0.0.0.0) and addresses of unsupported Classes (e.g., Class E). For entities that are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.

IP 10: The total number of IP datagrams that local IP user-protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in IP 8.

IP 11: The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (e.g., for lack of buffer space). Note that

this counter would include datagrams counted in IP 8 if any such packets met this (discretionary) discard criterion.

IP 12: The number of IP datagrams discarded because no route could be found to transmit them to their destination. Note that this counter includes any packets counted in IP 8 which meet this `no-route' criterion. Note that this includes any datagrams that a host cannot route because all of its default gateways are down.

IP 13: The number of IP datagrams that have been successfully fragmented at this entity.

IP 14: The number of IP datagram fragments that have been generated as a result of fragmentation at this entity.

IP 15: The number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be, e.g., because their Don't Fragment flag was set.

12.2 TCP

12.2.1 SAMPLE REPORT – DM TCP

```
<DT-7000> dm tcp
tcp:
TCP 1  1215000 packets sent
       74247 data packets (963479 bytes)
TCP 2  46 data packets (650 bytes) retransmitted
       0 resends initiated by MTU discovery
       1021108 ack-only packets (905646 delayed)
       0 URG only packets
       0 window probe packets
       68 rcv window update packets
       119724 control packets
TCP 3  2067762 packets received
       114483 acks (for 983715 bytes)
       81356 duplicate acks
       0 acks for unsent data
       1656659 packets (46725796 bytes) received in-sequence
       68313 completely duplicate packets (12111 bytes)
       0 old duplicate packets
       0 packets with some dup. data (0 bytes duped)
       7510 out-of-order packets (443 bytes)
       0 packets (0 bytes) of data after window
       0 window probes
       172 xmt window update packets
       0 packets received after close
       0 discarded for bad checksums
       0 discarded for bad header offset fields
       0 discarded because packet too short
```

```
TCP 4  99112 connection requests
TCP 5  7974 connection accepts
TCP 6  3 bad connection attempts
       50 listen queue overflows
TCP 7  20624 connections established (including accepts)
TCP 8  113169 connections closed (including 450 drops)
       51 connections updated cached RTT on close
       51 connections updated cached RTT variance on close
       8 connections updated cached ssthresh on close
TCP 9  86448 embryonic connections dropped
TCP 10 114403 segments updated rtt (of 200957 attempts)
TCP 11 19433 retransmit timeouts
TCP 12 2 connections dropped by rexmit timeout
TCP 13 0 persist timeouts
TCP 14 0 connections dropped by persist timeout
TCP 15 10223 keepalive timeouts
       0 keepalive probes sent
TCP 16 9630 connections dropped by keepalive
       22427 correct ACK header predictions
       1616588 correct data packet header predictions
```

12.2.2 MEASUREMENT DESCRIPTIONS – DM TCP

TCP 1: The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.

TCP 2: The total number of segments retransmitted – that is, the number of TCP segments transmitted containing one or more previously transmitted octets.

TCP 3: The total number of segments received, including those received in error. This count includes segments received on currently established connections.

TCP 4: The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

TCP 5: The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.

TCP 6: The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

TCP 7: The number of TCP connections reaching the ESTABLISHED state.

TCP 8: The number of TCP connections or connection attempts that have been closed. Drops are closes initiated at the local end of the connection.

TCP 9: The number of connections closed that never reached ESTABLISHED state.

TCP 10: The count of window size updates based on round trip estimate.

TCP 11: The number of time expirations while awaiting an expected ACK.

TCP 12: The number of connections dropped because of the above timeout

TCP 13: The number of time expirations while waiting for window to open

TCP 14: The number of connections dropped because of the above timeout

TCP 15: The number of keep-alive timer expirations on idle connections

TCP 16: The number of connections dropped because of the above timeout

12.3 UDP

12.3.1 SAMPLE REPORT – DM UDP

```
<DT-7000> dm udp
udp:
       834716 datagrams received
UDP 1  0 with incomplete header
UDP 1  0 with bad data length field
UDP 1  0 with bad checksum
UDP 2  1 dropped due to no socket
UDP 2  189454 broadcast/multicast datagrams dropped due to no socket
UDP 1  0 dropped due to full socket buffers
       645262 not for hashed pcb
UDP 3  645261 delivered
UDP 4  570930 datagrams output
```

12.3.2 MEASUREMENT DESCRIPTIONS – DM UDP

UDP 1: The number of received UDP datagrams that could not be delivered, broken down by reasons other than the lack of an application at the destination port.

UDP 2: The number of received UDP datagrams for which there was no application at the destination port.

UDP 3: The total number of UDP datagrams delivered to UDP users.

UDP 4: The total number of UDP datagrams sent from this entity.

12.4 ICMP

12.4.1 SAMPLE REPORT – DM ICMP

Note - within the output and input histograms embedded in this report, only parameters with non-zero values will be printed.

```
<DT-7000> dm icmp
icmp:
ICMP 1 1 call to icmp_error
       0 errors not generated 'cuz old message was icmp
       Output histogram:
ICMP 2        echo reply: 8
ICMP 3        destination unreachable: 1
ICMP 4        source quench: 1
ICMP 5        routing redirect: 2
ICMP 6        echo: 3
ICMP 7        time exceeded: 1
ICMP 8        parameter problem: 1
ICMP 9        time stamp: 2
ICMP 10       time stamp reply: 1
ICMP 11       address mask request: 1
ICMP 12       address mask reply: 1
       0 messages with bad code fields
       0 messages < minimum length
       0 bad checksums
       0 messages with bad length
       Input histogram:
ICMP 13       echo reply: 4
ICMP 14       destination unreachable: 74369
ICMP 15       source quench: 1
ICMP 16       routing redirect: 1
ICMP 17       echo: 8
ICMP 18       time exceeded: 1
ICMP 19       parameter problem: 1
ICMP 20       time stamp: 2
ICMP 21       time stamp reply: 2
ICMP 22       address mask request: 1
ICMP 23       address mask reply: 1
       8 message responses generated
```

12.4.2 MEASUREMENT DESCRIPTIONS – DM ICMP

ICMP 1: The number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).

ICMP 2: The number of ICMP Echo Reply messages sent.

ICMP 3: The number of ICMP Destination Unreachable messages sent.

ICMP 4: The number of ICMP Source Quench messages sent.

ICMP 5: The number of ICMP Redirect messages sent.

ICMP 6: The number of ICMP Echo (request) messages sent.

ICMP 7: The number of ICMP Time Exceeded messages sent.

ICMP 8: The number of ICMP Parameter Problem messages sent.

ICMP 9: The number of ICMP Timestamp (request) messages sent.

ICMP 10: The number of ICMP Timestamp Reply messages sent.

ICMP 11: The number of ICMP Address Mask Request messages sent.

ICMP 12: The number of ICMP Address Mask Reply messages sent.

ICMP 13: The number of ICMP Echo Reply messages received.

ICMP 14: The number of ICMP Destination Unreachable messages received.

ICMP 15: The number of ICMP Source Quench messages received.

ICMP 16: The number of ICMP Redirect messages received.

ICMP 17: The number of ICMP Echo (request) messages received.

ICMP 18: The number of ICMP Time Exceeded messages received.

ICMP 19: The number of ICMP Parameter Problem messages received.

ICMP 20: The number of ICMP Timestamp (request) messages received.

ICMP 21: The number of ICMP Timestamp Reply messages received.

ICMP 22: The number of ICMP Address Mask Request messages received.

ICMP 23: The number of ICMP Address Mask Reply messages received.

12.5 ETH

12.5.1 SAMPLE REPORT – DM ETH

```
<dolphin: DT-7000> dm eth
Name Mtu   Network       Address            Ipkts Ierrs    Opkts Oerrs  Coll Drop
LCL  16384 <Link>                             2     0        2     0     0   0
LCL  16384 127           127.0.0.1            2     0        2     0     0   0
SNP  1500  <Link>                            0     0        0     0     0   0
ETH  1500  <Link>00.60.1d.03.3c.fe        8940531     0   314297     5     0   0
ETH  1500  192.168.8     192.168.8.200    8940531     0   314297     5     0   0
ETH  1500  192.168.8.47/ 192.168.8.47     8940531     0   314297     5     0   0
<dolphin: DT-7000>
```

13 APPENDIX F: DT-7000 SPECIFICATIONS

Note: Shielded cables must be used in order to maintain compliance with EMC requirements.

13.1 CON (CONSOLE)

A standard interface that uses binary data interchange between DTE and DCE. The RS-232C interface uses an RJ45 connector and operates at 9600 bits per second (bps), 8 bits per character, no parity, and one stop bit

13.2 10/100 BASE-T LAN

Eight-pin, 10/100 Base-T modular connector for a 10/100 Mbps baseband CSMA/CD local area network.

13.3 PHYSICAL DIMENSIONS

L= 16.9 x W=8.77 x D=1.72

13.4 ENVIRONMENTAL OPERATING RANGE

Operating Temperature	5° to 40°C (41°F to 104°F)
Operating Humidity	5% to 85%
Altitude	From 60M (197ft.) below sea level to 1800 m (5905 ft.) above sea level

Table 16: Environmental Operating Ranges

13.5 POWER REQUIREMENTS

Voltages	**Current Draw**
Power Input Requirements	
DT-7000 Operating Voltage	5V @ 1920 mA Nominal
115 V AC to 24 V DC power supply	24V @ 400 mA Nominal 24V @ 820 mA Maximum
-48 V DC power source	48V @ 200 mA Nominal 48V @ 380 mA Maximum
POE (-48V DC)	Same as -48 V DC power
Power Output Requirements	
5 V Output Connection	5 V DC @ 2750 mA Maximum

Table 17: Power Requirements

13.6 REGULATORY INFORMATION

Safety	UL (US, Canada)
EMC	FCC Part 15B Class A, ICES-003 Class A
NEBS	Level 3 Compliant – designed and built to applicable GR-1089-CORE and GR-63-CORE requirements

Table 18: Regulatory Information

To maintain compliance with the above-mentioned EMC standards, shielded cables must be used on all DT-7000 interface connections and the shields must make an electrical connection to the DT-7000's grounding system.

14 HARDWARE WARRANTY

The warranty period for hardware shall be ninety (90) days from the date of shipment from Datatek Applications, Inc. Replacements and repairs are guaranteed for the longer of the remaining original warranty period or 30 days.

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