

TDC



Theater Deployable Communications

Baseline Requirements Document

Red Data Module

RDM (v1.1)

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1.0 SCOPE

This requirements document establishes the performance, manufacture and test requirements for the TDC ICAP Red Data Module v1.1.

2.0 APPLICABLE DOCUMENTS

To the extent specified herein, the following documents of latest current issue on the date of this Baseline Requirements Document form part of this BRD.

Table 1 - Standards and Applicable Documents

Document Number	Title
EIA/TIA-232-E Jul94	Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Binary Data Interchange (Rates to 20kbps)
ISO/IEC 8802-3 1996ANSI/IEEE Std 802.3 1996	Information Technology-Local Metropolitan Area Network-Part3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access Method and Physical Layer Specification.
TIA/EIA-422-B	Electrical Characteristics of Balanced Voltage Digital Interface Circuits (ANSI/TIA/EIA-422-B-94) (May, 1994)
EIA-530	High Speed 25 — Position Interface for Data Terminal Equipment and Data Circuit — Terminating Equipment, (June 1992)
	TDC Standards Document
MIL-STD-810F	Environmental Test Methods
Cisco	Cisco IOS Software/Product Documentation CDs
Cisco	Cisco 2950C Manual
Cisco	Cisco 2621XM Manual
General Dynamics	TACLANE E-100 User Manual
General Dynamics	GEM LITE (TACLANE Management)

3.0 REQUIREMENTS

3.1 Module Definition

The RDM provides a secure interface for computer workstations and local network devices (hubs, switches, etc.) utilizing the Internet Protocol (IP) to exchange classified data between nodes of the TDC ICAP. The electrical interfaces available to the local secure LAN user are 10/100BaseTX autosensing half/full duplex, 100BaseFX full duplex and 10BaseFL. Local Serial interfaces are low-speed synchronous EIA-530 and asynchronous EIA-232. Figure 1 shows a functional diagram of the RDM and the interconnections within TDC ICAP.

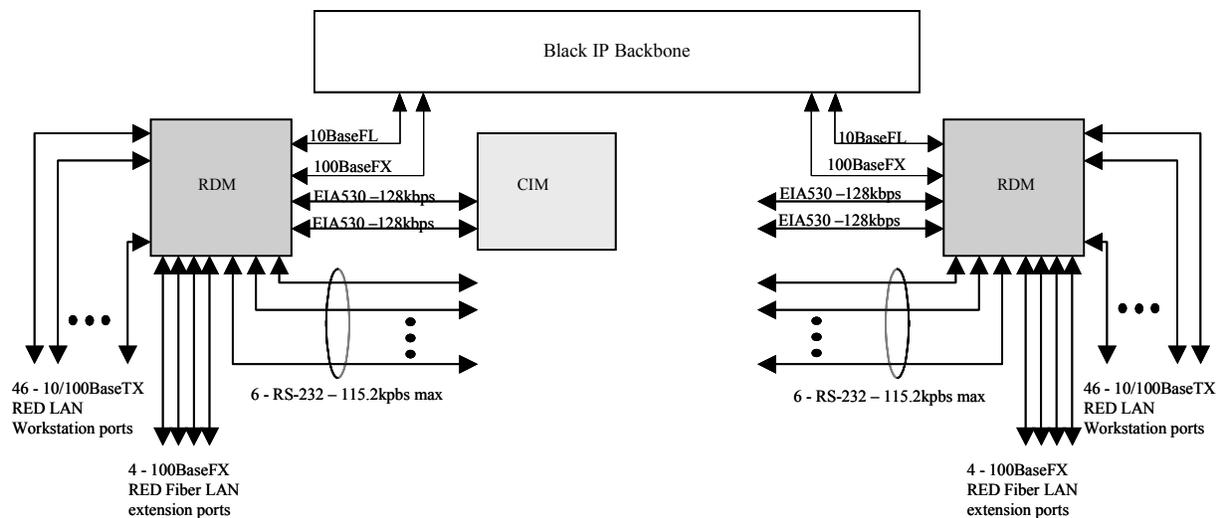


Figure 1 - Red Data Module Functional Diagram

The RDM contains a Cisco Router, which provides two 10/100 autosensing Ethernet ports and a WAN interface providing 6 Asynchronous ports (115.2 kbps) and 2 Synchronous Low Speed ports (128 kbps). Two Cisco Ethernet Switches with 24 10/100 LAN ports and 2 100BaseFX ports. A TACLANE-E100 Inline Network Encryptor with Red/Black 10/100BaseTX or 100BaseFX connectivity.

Inter-ICAP encryption of classified IP data is performed by an Ethernet encryption system and transmitted to other TDC ICAP modules using either a 10BaseFL or 100BaseFX signal. The Ethernet encryptor provides network encryption security designed to Secure Data Network System (SDNS) standards and is endorsed by NSA to handle classified (Type 1) data up to the Top Secret level.

Access to the RDM is through the module's user ports as shown in Figure 4 of this document. The input power connection is at the power conditioner.

3.2 Performance Requirements

3.2.1 Electrical Interface Requirements (External)

The RDM shall include the number and type of external interfaces presented in Table 2.

Table 2 - RDM External Interface Characteristics

Signal Name	Quantity	Connector	I/O	Internal Interface	Electrical Characteristics
Prime power	1	IEC 320-C20 Receptacle	I	Local power source	100 to 240 VAC 47 to 63 HZ
10BaseT/ 100BaseTX/ 10/100BaseTX (Routers and IP Backbone)	48	RJ 45	I/O	Cisco 2950C-XL (two switches A and B)	IEEE Std 802.3
	2	RJ-45	I/O	Cisco 2621XM Router	IEEE Std 802.3
	1	RJ-45	I/O	Ethernet Patch Panel Input	IEEE Std 802.3
	1	RJ-45	I/O	Ethernet Patch Panel Input	IEEE Std 802.3
10BaseFL (IP Backbone port)	1	ST (Fiber Optic Pair)	I/O	External connections	IEEE Std 802.3
100BaseFX (IP Backbone port)	1	ST (Fiber Optic Pair)	I/O	External connections	IEEE Std 802.3
100BaseFX (Encryptor Red port)	1	ST (Fiber Optic Pair)	I/O	TACLANE E-100 INE	IEEE Std 802.3
100BaseFX (Encryptor Black port)	1	ST (Fiber Optic Pair)	I/O	TACLANE E-100 INE	IEEE Std 802.3
100BaseFX (Switch Fiber port)	4	ST (Fiber Optic Pair)	I/O	IP Backbone	IEEE Std 802.3
EIA-530 Synchronous Router Ports (S 1/6 and S 1/7)	2	DB25F	I/O	Cisco 2621XM (NM-8A/S) Router module	EIA-530
RS-232 Asynchronous Ports (S 1/0 through S 1/5)	6	DB25F	I/O	Cisco 2621XM (NM-8A/S) Router module	RS-232
Admin (Router port)	1	DB9F	I/O	Cisco 2621XM Router	RS-232

Table 2 - RDM External Interface Characteristics

Signal Name	Quantity	Connector	I/O	Internal Interface	Electrical Characteristics
Admin (Switch port)	1	DB9F	I/O	Cisco 2950C-XL Ethernet Switch-A	RS-232
Admin (Switch port)	1	DB9F	I/O	Cisco 2950C-XL Ethernet Switch-B	RS-232

3.2.1.1 Prime Power

The RDM is designed to operate from 100 to 130 VAC and 200 to 240 VAC, 50 to 60 Hz, single phase, three-wire power. The RDM includes an internal power conditioner to minimize line variation and transients. The prime power connector is an IEC 320-C20 receptacle. Separate breakers are provided on the power conditioner for each prime component. (TACLANE E-100, Ethernet Switch-A, Ethernet Switch-B, Router) Each breaker must be labeled to indicate the component that it controls. 10/100BaseTX (Switch A ports E 0/1-0/24, Switch B ports E 0/1-0/24, Router ports E0/0 and 0/1, Encryptor Red and Black ports, IP Data Backbone Input 10BaseFL and 100BaseFX ports).

3.2.1.2 10BaseT, 100BaseTX and 10/100BaseTX (Routers and IP Backbone)

These connections provide 10BaseT, 100BaseTX and 10/100BaseTX connectivity to the data network. Each connector is an eight-wire RJ45 type modular female jack connector and pin assignments in accordance with IEEE 802.3 for Ethernet signals over Unshielded Twisted Pair (UTP) cable, as shown in Table 3.

Table 3 - RJ-45 Connection Pinout for 10BaseT and 100BaseTX Connector

Pin	Signal
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-

3.2.1.3 10BaseFL (IP Backbone port)

The fiber Ethernet interface operates at a wavelength of 850 nanometers.

This connection provides 10BaseFL connectivity to the data network. The connector is a multimode fiber-optic cable with ST-type connector.

Protective covers are provided for all fiber connectors and cables. Keep these covers in place on any fiber Ethernet connectors or cables not in use to shield them from dust or damage, minimizing the potential for optical signal attenuation or data loss.

3.2.1.4 100BaseFX (IP Backbone port and Switch Fiber ports)

This connection provides 100BaseFX connectivity to the data network. The connector is a multimode fiber-optic cable with ST-type connector. The interface consists of a pair of female connectors on the module back panel, which connect to the equipment inside the module using the male connections specified in Table 4. The fiber Ethernet interface operates at a wavelength of 1300 nanometers.

Protective covers are provided for all fiber connectors and cables. Keep these covers in place on any fiber Ethernet connectors or cables not in use to shield them from dust or damage, minimizing the potential for optical signal attenuation or data loss.

Table 4 - ST Fiber Optic Connector Specification

Multimode Fiber Optic Cable Specification
100BaseFX -- ISO/IEC 9314-3
62.5 micron with a optical loss of no more than 9 dB

3.2.1.5 100BaseFX (Encryptor Red and Black ports)

This connection provides 100BaseFX connectivity to the data network. The connector is a multimode fiber-optic cable with ST-type to MT-RJ connector. The interface consists of a pair of female connectors on the module back panel, which connect to the equipment inside the module using the male ST connectors specified in Table 5.

Table 5 - ST Fiber Optic Connector Specification

Multimode Fiber Optic Cable Specification
100BaseFX -- ISO/IEC 11801
62.5 micron with a optical loss of no more than 9 dB

3.2.1.6 Serial Router Ports

3.2.1.6.1 EIA-530 Synchronous Router Ports (S 1/6 and S 1/7)

Interface connectors are DB-25(F) type. Pin assignments are in accordance with EIA-530 as shown in Table 6.

Table 6 - EIA-530 Synchronous Serial Data Interface

Pin	Signal	I/O	Pin	Signal	I/O
1	Shield	–	14	Transmit Data Return	O
2	Transmit Data	O	15	Transmit Clock	I
3	Receive Data	I	16	Receive Data Return	I
4	Request to Send	O	17	Receive Clock	–
5	Clear to Send	I	18	NC	–
6	Data Set Ready	I	19	Request to Send Return	O
7	Signal Ground	–	20	Terminal Ready	O
8	Receiver Ready (DCD)	I	21	NC	–
9	Receive Clock Return	–	22	Data Set Ready Return	I
10	Receiver Ready Return	I	23	Terminal Ready Return	O
11	Terminal Timing	O	24	Terminal Timing Return	O
12	Transmit Clock Return	I	25	NC	-
13	Clear to Send Return	I			

Note: I/O direction is with respect to the router

3.2.1.7 RS-232 Asynchronous Ports (S 1/0 through S 1/5)

Interface connectors are DB–25 (F) type. Pin assignments are in accordance with RS–232 as shown in Table 7.

Table 7 - RS-232 IP Asynchronous Serial

Pin	Signal	I/O	Pin	Signal	I/O
1	Shield Ground	–	14	NC	-
2	Transmit Data +	O	15	Transmit Clock +	I
3	Receive Data +	I	16	NC	-
4	Request to Send +	O	17	Receive Clock +	I
5	Clear to Send +	I	18	Link Loss	O
6	Data Set Ready +	I	19	NC	-
7	Circuit Ground	-	20	Data Terminal Ready +	O
8	Data Carrier Detect +	I	21	NC	-
9	NC	-	22	NC	-
10	NC	-	23	NC	-
11	NC	-	24	Transmit Clock External +	O
12	NC	-	25	NC	-
13	NC	–			

Note: I/O direction is with respect to the router

3.2.1.8 Admin (Router and Switch ports)

The 2621XM Router and the two-2950C Ethernet switch's Administration ports are in accordance with the DB 9 RS-232 standards using the VT100 Emulators. Each Admin connector is a DB-9F with pin assignments as shown in Table 8.

Table 8 - Admin Interfaces

Pin	Signal	Pin	Signal	Pin	Signal
1	Data Carrier Detect	4	Data Terminal Ready	7	Request to Send
2	Received Data	5	Signal Ground	8	Clear to Send
3	Transmitted Data	6	Data Set Ready	9	Ring Indicator

3.2.2 Electrical Interface (Internal)

This documentation shows the internal wiring of the major module components and the details of each major cable assembly internal to the module. This information is found in Paragraph 6.3.

3.2.3 Functional Requirements

3.2.3.1 Basic Configuration

Figure 2 shows the Red Data Module internal and external interconnections.

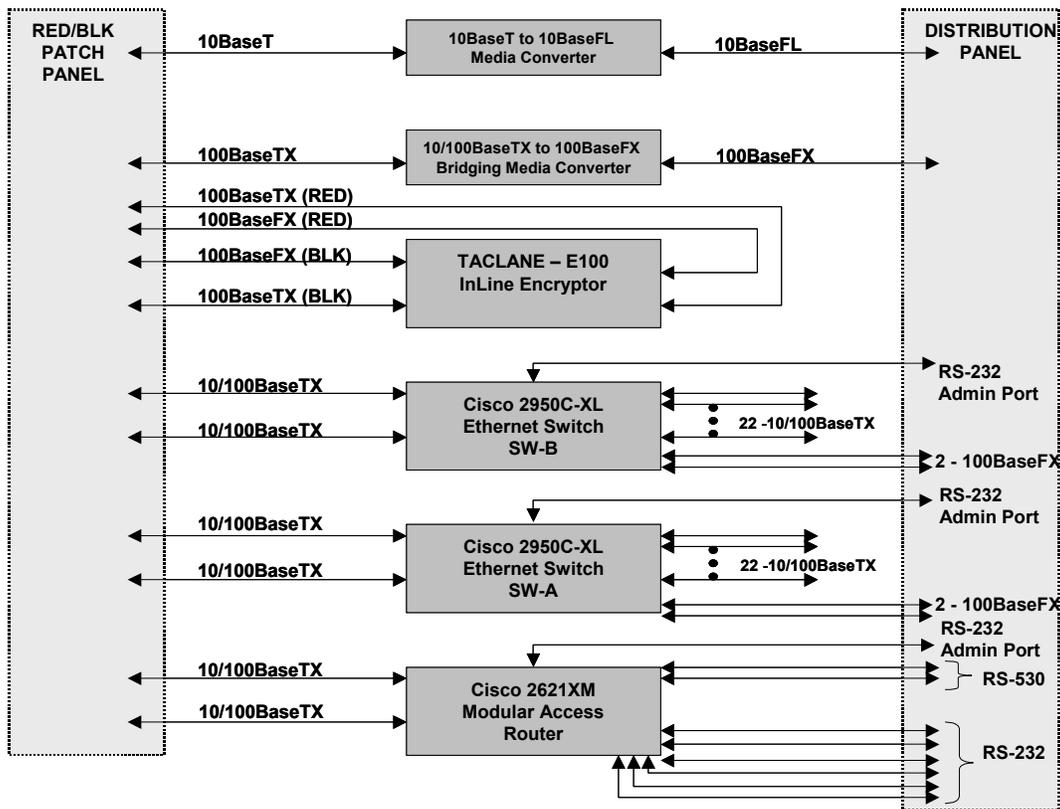


Figure 2 - Internal Functional Block Diagram

3.2.3.1.1 TACLANE-E100

The TACLANE-E100 provides 100 Mbps encryption over IP. It incorporates Multimode fiber 100BaseFX (MT-RJ) and Autosensing 10/100BaseTX (RJ-45) interfaces on both the Red and Black sides. These interfaces appear on the Red/Blk patch panel. Encrypted data is transmitted through other TDC ICAP modules using the 10BaseFL or 100BaseFX IP backbone. The TACLANE-E100 provides network encryption security and is endorsed by NSA to handle classified (Type 1) data up to the Top Secret level. The encryptor will contain a unique encryption key variable, which will only permit communications with networks secured with like encryptors using the same version of keying material.

Configuration of the TACLANE network can be performed using GEM Lite software package. This application enables an authorized Controlling Authority to manage networks of up to 25 TACLANEs remotely.

A separate Keyceptacle is available at the front panel of the Ethernet encryptor. The Keyceptacle accepts the KSD-1 Crypto Ignition Key (CIK) for loading cryptographic keying material (KEYMAT). A Key fill Receptacle is also available at the front panel of the Ethernet encryptor.

The key fill provides key fills via Data Transfer Device. The Keyceptacle and Key Fill is factory integrated into the device by the OEM.

3.2.3.1.2 Cisco 2950C-XL Ethernet Switches

The two 2950 Ethernet switches provide access for up to 46 10/100BaseTX Red LAN users. Four-100BaseFX Red ports support expansion of the RED LAN. Two LAN ports from each switch appear on the Red/Blk patch panel allowing the switch to be placed in front/behind the Router and or TACLANE as desired or to be connected together.

3.2.3.1.3 Cisco 2621XM Modular Access Router

When placed on the classified side via the Ethernet patch panel the router provides connectivity for classified remote workstations via 6 serial ports (RS-232) and an additional two serial ports configured as EIA-530. When placed on the unclassified side the router can provide the same connectivity for unclassified remote workstations. This router is configured with the Cisco Internetworking Operating System (IOS) version 12.1(19) with the IP Plus feature set.

The Cisco 2621XM provides the following interfaces installed as part of the chassis and in the modular slot:

- Eight-port serial module
 - Two EIA-530 interfaces (128Kbps max rate)
 - Six RS-232 interfaces (115.2Kbps max rate)
- Two 10/100BaseTX Ethernet ports are provided for LAN connection.

3.2.3.2 IP Backbone Connectivity

One 100BaseFX fiber optic multi mode output port is provided at the I/O Distribution Frame. This port is provided for connectivity to the 100Mbps Datagram Switched Network backbone and interconnections to other modules that are collocated (for example Radio Frequency Module, Crypto Interface Module, and Basic Access Module).

One 10BaseFL fiber optic multimode output port is provided at the I/O Distribution Frame. This port is provided for connectivity to the 10Mbps Datagram Switched Network and interconnections to other modules that are collocated (for example Radio Frequency Module v1, TSSR Interface Unit v1).

3.2.3.3 Administration

The functions of the RDM are administered via an external PC computer interconnected to the administration port connectors of the Cisco 2950C-XL switches and the Cisco 2621XM Router. Alternatively, SNMP or Web based configuration and monitoring can be accomplished via the Ethernet ports on these components. Management of the following functions is provided:

- a) Configuration
- b) Status

c) Control

Administration of the TACLANE unit is either accomplished from the front panel or through the GEM Lite software. The GEM Lite software can configure a TACLANE network. This application enables an authorized Controlling Authority to manage networks of up to 25 TACLANE's remotely.

3.2.3.4 Configuration Options

Many of the system level and maintenance kits can be used for RDM module. These kits include:

- Cable Maintenance Kit
- LAN Kit
- Fiber Cable Kit
- Laptop Computer Kit
- Small UPS Kit
- Large UPS Kit
- Router Kit
- Data Extension Kit

3.2.4 Physical Characteristics

3.2.4.1 Transit Case

The module is housed in a 13 U transportable container (transit case), approximately 22.5"W. x 27.3"H. x 34.5"D. The transit cases are designed to stack on top of and mechanically interlock to like cases. The frame inside the transit case is designed to slide out of the case to allow removal and replacement of Line-Replaceable-Units in the field. The transit cases with their covers in place are designed to protect the electronic equipment inside from direct exposure to environmental conditions; e.g., rain, snow, ice, dust, etc., likely to be encountered during world wide military transit.

3.2.4.2 Weight

The module, including all internally carried cables, does not exceed TBD.

3.2.4.3 Storage Space

The module transit cases include storage pouches within its covers to contain cables, manuals, etc. that must be transported and used with the module.

3.2.4.4 Marking

See TDC Standards Document for required markings.

3.2.5 Cables and Accessories

The RDM includes the cables listed in Table 9, stored within the covers. Strain relief and cable management hardware are provided with the module.

Table 9 - Cables and Terminators included with RDM

Function	Color Code	Quantity	Description
Power	N/R	1	IEC-320 C20 Jack to NEMA 5-15P (10 ft. length)
IP Backbone	N/R	1	3 Pair Fiber Optic Cable ST-ST plug, 20ft
Black	Black	2	10/100BaseTX Black Patch Crossover Cable (2 ft)
Red	Red	2	10/100BaseTX Red Patch Crossover Cable (2 ft)
Configuration Port	N/R	1	Admin Cable DB 9 Plug to DB 9 Jack pin-to- pin (10ft)
Black	Black	4	10/100BaseTX Black Patch Straight-thru Cable(2ft)
Red	Red	4	10/100BaseTX Red Patch Straight-thru Cable (2ft)

3.2.6 Reliability

The module with its standard complement of LRUs, have a mean time between failure (MTBF) commensurate with similar commercial equipment in its class. The actual MTBF for the major system components are shown in Table 10. Where reliability data is not readily available from the vendor, this is indicated.

Table 10 - MTBF of Major Components

Component	MTBF
Cisco 2950C-XL	268,292 hours
Cisco 2621XM	Not Available
Media Converters	Not Available
TACLANE E100	25,000 hours

3.2.7 Maintainability

Maintainability characteristics will be part of the selection criteria for all hardware. Ease of maintenance, such as accessibility to Line Replaceable Units, fault detection/isolation software capability, and fault annunciation will be considered.

3.2.7.1 Mean Time Between Preventive Maintenance

The Mean Time Between Preventive Maintenance, during operation, is 30 days. The duration of preventive maintenance actions such as corrosion control, cleaning filters, etc., does not exceed 30 minutes.

3.2.8 Environmental Conditions

During storage, transport and operation the modules can withstand exposure to temperatures as shown in Table 11.

3.2.8.1 Temperature

Temperature characteristics for the major equipment components are shown in Table 11.

Table 11 - Module Temperature Characteristics

Equipment	Temperature (degrees C)	
	Operating	Non-Operating
Cisco 2950C-XL	0 to 40	-25 to 70
Cisco 2621XM	0 to 40	-20 to 70
Media Converters	0 to 50	-20 to 85
TACLANE E100	-20 to 50	-31 to 65

3.2.8.2 Relative Humidity

Relative humidity characteristics for the major equipment components are shown in Table 12.

Table 12 - Module Humidity Characteristics

Equipment	Humidity
	Non-condensing
Cisco 3745 Router	5 to 95%
CV-8448-D	5 to 95%
KIV-7HSB Encryptor	5 to 95%
KIV-7 Frame	10 to 95%

3.2.8.3 Altitude

Altitude characteristics for the major equipment components are shown in Table 13.

Table 13 - Module Altitude Characteristics

Equipment	Altitude (feet)	
	Operating	Non-Operating
Cisco 2950C-XL	-500 to 10,000	-1000 to 30,000
Cisco 2621XM	Not Available	Not Available
Media Converters	0 to 10,000	Not Available
TACLANE E100	0 to 15,000	0 to 40,000

3.2.8.4 Sand and Dust

During storage and transport, the modules are protected when exposed to sand and dust in accordance with the best commercial practices for close proximity to operating aircraft. During operation with covers removed, the modules can withstand sand and dust in accordance with the best commercial practices for natural conditions.

3.2.8.5 Shock

Module equipment racks are equipped with rubber shock isolation mounts and is protected from shocks induced during handling, setup and tear down. Modules and components can operate without degradation following exposure to the non-operating shock environment described by Method 516.5, Procedure VI (Bench Handling) of MIL STD 810F.

3.2.8.6 Vibration

The modules are equipped with rubber shock isolation mounts so that the modules can withstand the vibration encountered while being transported by commercial and military airlift, sealift and vehicular (over unimproved roads) systems. MIL-STD-810F, Method 514.5, Procedure I, Categories 4, 7 and 8 applies; alternative procedures may be substituted after TDC Program Office approval.

3.3 Design and Construction

3.3.1 Material Parts and Processes

This module is built to good commercial practices. Mechanical and electrical interchangeability exists between like systems, subsystems, assemblies, subassemblies and replaceable parts.

3.3.2 Safety

This module shall not present a safety, fire or health hazard to personnel.

3.3.2.1 Electrical Safety

This module is designed to eliminate the hazard to personnel of inadvertent lethal voltage contact. All electrical conductors carrying voltages in excess of 70 volts shall be insulated to prevent contact or covered by a protective barrier. All removable protective barriers shall be interlocked to automatically disconnect power behind the barrier upon removal or clearly marked with a warning label that indicates the voltage potential that will be encountered behind the barrier. All warning labels shall remain visible after the cover has been removed.

3.3.2.2 Mechanical Safety

Sharp surfaces shall have protective covers or other suitable features to minimize injury where personnel are likely to be exposed to such surfaces.

3.4 Logistics

This module accommodates a two level maintenance concept: organizational (Air Force personnel) and depot (contractor personnel). Removal and replacement of an LRU is defined at the organizational level and any needed repair of the LRU is defined at the depot level. Any special test or support equipment required to effect removal or replacement of an LRU at the organizational level can be provided as part of the module. No more than two persons shall be required to remove or replace an LRU.

An LRU is defined as the lowest element of the module which can be isolated to be faulty through inspection; built-in test; technical manuals; TDC-ICAP system performance; spares substitution; or other diagnostic aid approved by the Government for organizational level maintenance, exclusive of expendables such as fuses, lamps and LEDs. An LRU is defined at the card/module level or higher.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General

The quality assurance program includes tests and other evaluations to the extent specified herein. The quality assurance program is designed to verify the electrical, mechanical and functional characteristics of each module. The purpose is to ensure that each module complies with or performs better than the requirements specified herein.

4.2 Responsibility for Inspection

Unless otherwise specified in the contract, the contractor shall be responsible for the performance of all inspection requirements and may use his own or any other facilities suitable for the performance of the inspection requirements. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.3 Product Qualification Test (PQT)

Inspections, analyses, demonstrations and tests verify compliance of Section 3 of this specification on the first production unit.

4.4 Production Acceptance Test (PAT)

Each module delivered to the Government undergoes an Acceptance Test Process as identified in Table 14. The acceptance test verifies that the module interfaces are operating properly prior to delivery to the Government.

4.5 Verification Cross Reference Matrix (VCRM)

Table 14 provides a list of each Section 3 requirement and the verification method to be used. The following paragraphs define the codes employed in the VCRM. Unless otherwise noted, where more than more one verification method is shown, one method or a combination of methods may be used to show compliance.

4.5.1 Not Required (N/R)

This method indicates that verification is not required because the paragraph is a title, heading, general introductory paragraph or statement of a goal and contains no “shall” or “must” statements.

4.5.2 Inspection

Inspection is a method of verification of the module performance or characteristics by examination of the equipment or associated documentation. Inspections are conducted with the use of inspection tools, measurement devices, visual means and comparison. Most inspections apply to verification of requirements associated with physical characteristics such as size, weight,

appearance, adherence to specified standards and engineering practices, quality design, and construction supported with quality documentation. Inspections also include the auditing of manufacturer’s data that verifies the performance of non-developmental items that comprise the TDC ICAP module. Inspections may occur during any assembly stage of the unit under test.

4.5.3 Analysis

Analysis is a method of verification through technical evaluation of calculations, computations, models, analytical solutions, use of studies, reduced data, and/or representative data to determine that the item conforms to the specified requirements.

4.5.4 Demonstration

Demonstration is a method of verification whereby the properties, characteristics and parameters of the item are determined by observation alone and without the use of instrumentation for quantitative measurements. This method is used when a requirement does not contain a specific numerical parameter that must be measured. Demonstrations may occur during verification of a unit under test at any assembly stage. Pass/fail criteria are simple yes/no indications of functional performance since no quantitative values are specified.

4.5.5 Test

Test is a method to verify that a specified requirement is met by thoroughly exercising the applicable item under specified conditions and by using the appropriate instrumentation in accordance with test procedures. This method requires the use of laboratory equipment, simulators, or services to verify compliance to the specified requirements. This method is used when it is practicable to make direct or indirect measurement of a specified numerical parameter to verify compliance with a requirement. Tests may occur during verification of a unit at any assembly stage. Actual measured values are recorded, and pass/fail is determined by comparing the measured value with the specified value. Measurement accuracy is precise enough to ensure that the measured value is within the specified tolerance.

Table 14 - Verification Cross Reference Matrix

Paragraph	Title	N/R	Verification Method				ATP
			PQT				
			Inspect	Analysis	Demo	Test	
3.0	Requirements	X					
3.1	Module Definition	X					
3.2	Performance Requirements	X					
3.2.1	Electrical Interface Requirements (External)	X					
3.2.1.1	Prime Power					X	
3.2.1.2	10BaseT/100BaseTX/10/100 BaseTX (Routers and IP Backbone)				X		X
3.2.1.3	10 BaseFL (IP Backbone port)				X		X

Table 14 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
		N/R	PQT				ATP
			Inspect	Analysis	Demo	Test	
3.2.1.4	100 BaseFX (IP Backbone port and Switch Fiber ports)				X		X
3.2.1.5	100BaseFX (Encryptor Red and Black ports)				X		X
3.2.1.6	Serial Router Ports				X		X
3.2.1.6.1	EIA – 530 Synchronous router Ports (S 1/6 and S 1/7)				X		X
3.2.1.6.2	RS-232 Asynchronous Ports (S 1/0 through S 1/5)				X		X
3.2.1.7	Admin (Router and Switch ports)				X		X
3.2.2	Electrical Interface (Internal)	X					
3.2.3	Functional Requirements	X					
3.2.3.1	Basic Configuration	X					
3.2.3.1.1	Taclane-E100				X		X
3.2.3.1.2	Cisco 2950C-XL Ethernet Switches				X		X
3.2.3.1.3	Cisco 2621XM Modular Access Router				X		X
3.2.3.2	Backbone Connectivity				X		X
3.2.3.3	Administration				X		X
3.2.3.4	Configuration Kits	X					
3.2.4	Physical Characteristics	X					
3.2.4.1	Transit Case		X				
3.2.4.2	Weight					X	
3.2.4.3	Storage Space		X				
3.2.4.4	Marking		X				
3.2.5	Cables And Accessories				X		
3.2.6	Reliability			X			
3.2.7	Maintainability			X			
3.2.7.1	Mean Time Between Preventive Maintenance [MTBPM]			X			
3.2.8	Environmental Conditions	X					
3.2.8.1	Temperature					X	
3.2.8.2	Relative Humidity			X			
3.2.8.3	Altitude			X			
3.2.8.4	Sand and Dust			X			
3.2.8.5	Shock					X	
3.2.8.6	Vibration					X	
3.3	Design and Construction	X					

Table 14 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
		N/R	PQT				ATP
			Inspect	Analysis	Demo	Test	
3.3.1	Materials Parts and Processes			X			
3.3.2	Safety	X					
3.3.2.1	Electrical Safety			X		X	
3.3.2.2	Mechanical Safety		X	X			
3.4	Logistics			X			

5.0 PREPARATION FOR DELIVERY

Each module is packaged for shipment and the package marked in accordance with the requirements of the contract under which the module is ordered.

6.0 BASELINE CONFIGURATION

6.1 Equipment

Table 15 - Equipment Listing

Device	Manufacturer	Part Number	Description	Quantity
Router	Cisco	CISCO2621XM	Modular router with two 10/100 Mbps Ethernet ports	1
Memory Upgrade	Cisco	MEM2600XM-32U64D	32 to 64 MBDRAM memory upgrade for IOS	1
8 Port Async/ Sync card for Cisco 2621XM	Cisco	NM-8A/S	WAN card to provide 6 Asynchronous ports (115.2Kbps) and 2 low speed Synchronous ports (128Kbps)	1
Ethernet Switch	Cisco	WS-C2950C-24	Ethernet Switch with 24 10/100BaseTX LAN ports and 2 100BaseFX ports	2
Inline Network Encryptor	General Dynamics	ET-59000-1	TACLANE-E100(KG-175) Version 2.0E Provides Type 1 encryption over IP networks	1
GEM Lite Software	General Dynamics	EL-79002-1	TACLANE Management Software	1
Transit Case	ECS Composites	11722	Transit Case	1
Media Converter	Transition Networks	E-TBT-FRL-05	10BaseT to 10BaseFL Media Converter	1
Media Converter	Transition Networks	SBFTF1011-100	10/100BaseTX to 100BaseFX Bridging Media Converter	1
Media Converters Power Supply	Ault	SW109MA000 2F02	Power Supply	2
Power Conditioner	MARWAY	411355	Switched outlet power conditioner	1
Connector	Fiber Systems Int.	BSTA2000	Bulkhd Coup	16
Cable Mgmt Bar	Leviton Telcom	41150-019	Polytie Cable Mgmt Bar	2
Cable Loop	Leviton Telcom	41020-SPR	Polytie Cable Loop	2
(W1) Cable	TBD	TBD	Media Converter 10BaseT Cable	1
(W2) Cable	TBD	TBD	Media Converter 10/100BaseTX Cable	1
(W3) Cable	TBD	TBD	Media Converter Fiber Optic Cable	1
(W4) Cable	TBD	TBD	Media Converter Fiber Optic Cable	1
(W5, W8, W9, W10, W19, W20) Cables	TBD	TBD	TACLANE 100BaseFX ST to MT-RJ Fiber Optic Cable	6
(W6) Cable	TBD	TBD	Encryptor 10/100BaseTX Cable	1
(W7) Cable	TBD	TBD	Encryptor 10/100BaseTX Cable	1

Table 15 - Equipment Listing

Device	Manufacturer	Part Number	Description	Quantity
(W11) Cable	TBD	TBD	Cisco Ethernet Switch A/B admin Cable	1
(W12) Cable	TBD	TBD	Media Converter Y Power Cable	1
(W13) Cable	TBD	TBD	TACLANE Power Cable	1
(W14, W33, W34) Cables	TBD	TBD	Power Cable, Ethernet Switch and Router	3
(W15) Cable	TBD	TBD	Cisco 2950 Ethernet BaseTX Cable	1
(W16) Cable	TBD	TBD	Cisco 2950 Ethernet BaseTX Cable	1
(W17) Cable	TBD	TBD	Cisco 2950 Ethernet BaseTX Cable	1
(W18) Cable	TBD	TBD	Cisco 2950 Ethernet BaseTX Cable	1
(W21) Cable	TBD	TBD	Cisco Ethernet Switch A/B admin Cable	1
(W22) Cable	TBD	TBD	Cisco 2621XM Ethernet BaseTX Cable	1
(W23) Cable	TBD	TBD	Cisco 2621XM Ethernet BaseTX Cable	1
(W24, W25, W26, W27, W28, W29) Cables	TBD	TBD	Cisco 2621XM Router Asynchronous Cable	6
(W30, W31) Cables	TBD	TBD	Cisco 2621XM Router Synchronous Cable	2
(W32) Cable	TBD	TBD	Router Admin Cable	1
(P1) Cable (In Pouch)	TBD	TBD	10/100BaseTX Red Patch Crossover Cable (Stored in pouch)	2
(P2) Cable (In Pouch)	TBD	TBD	10/100BaseTX Black Patch Crossover Cable (Stored in pouch)	2
(P3) Cable (In Pouch)	TBD	TBD	10/100BaseTX Red Patch Straight-thru Cable (Stored in pouch)	4
(P4) Cable (In Pouch)	TBD	TBD	10/100BaseTX Black Patch Straight-thru Cable (Stored in pouch)	4
(P5) Cable (In Pouch)	TBD	TBD	Admin cable, DB9 plug to DB9 jack, 10 ft. (Stored in Pouch)	1
(P6) Cable (In Pouch)	TBD	TBD	3-pair Fiber Optic Cable, ST-ST plug, 20 ft. (Stored in Pouch)	1

6.2 Elevation Drawings

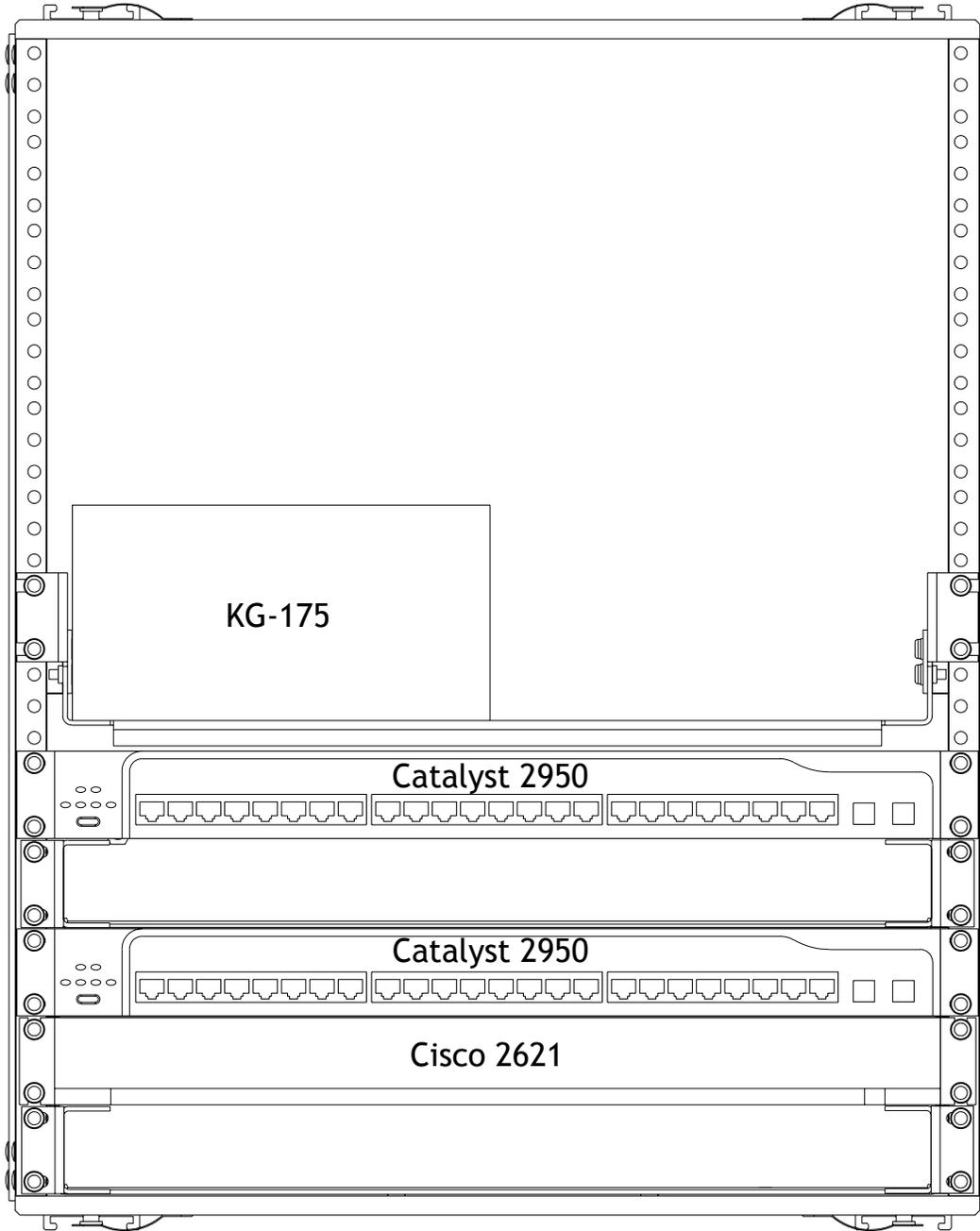


Figure 3 - Front Elevation

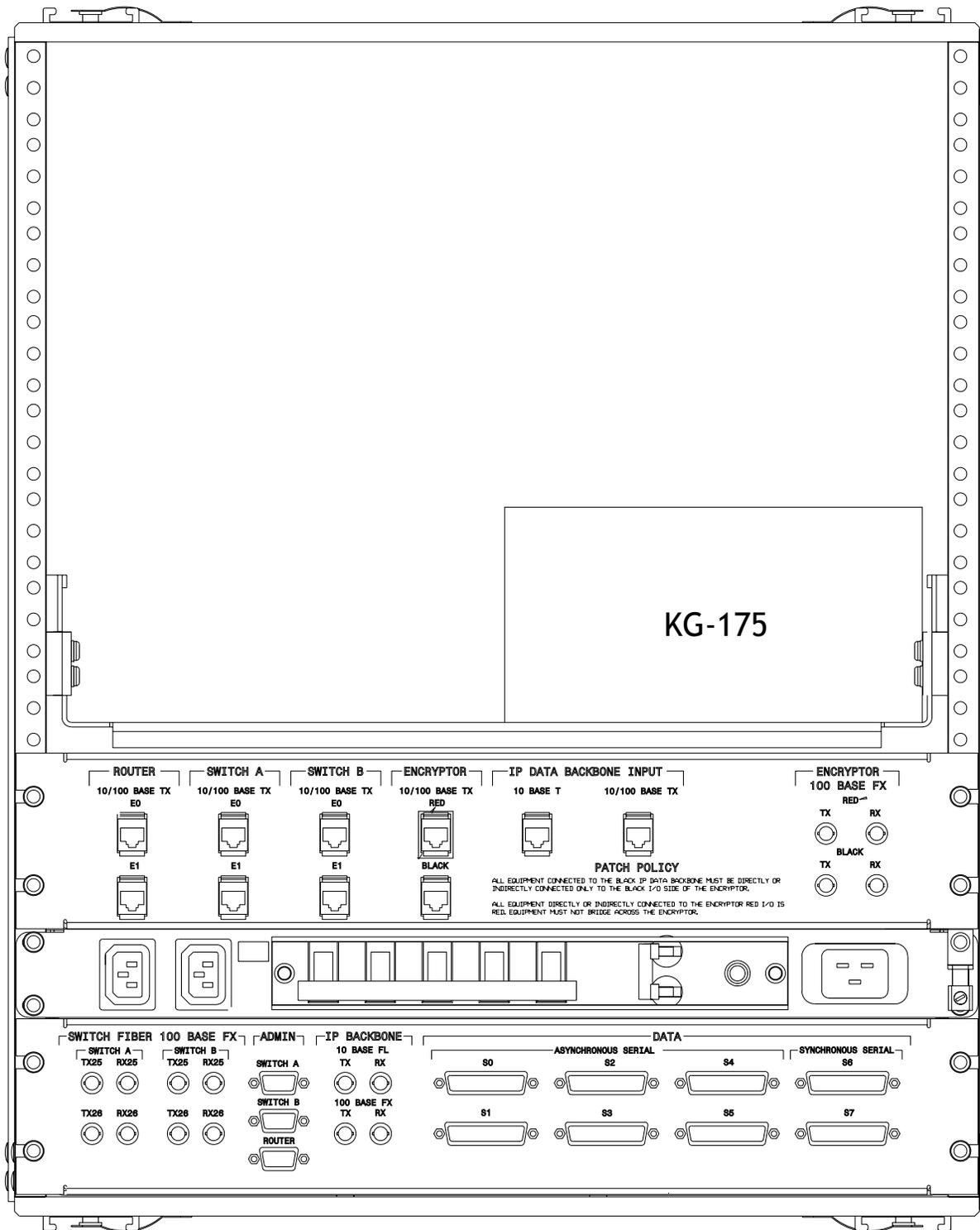


Figure 4 - Rear Elevation

6.3 Cable Diagrams

Table 16 - Cable Diagrams

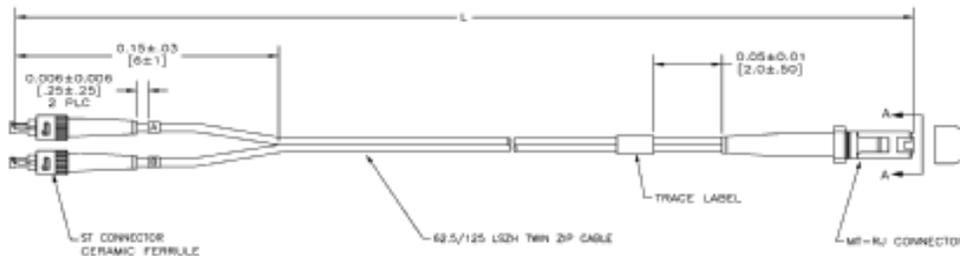
Wire Number	Manufacturer	Part Number	Description
W1	TBD	TBD	Media Converter 10BaseT Cable
W2	TBD	TBD	Media Converter 10/100BaseTX Cable
W3, W4	TBD	TBD	Media Converter Fiber Optic Cable
W5, W8, W9, W10, W19, W20	TBD	TBD	TACLANE 100BaseFX ST to MT-RJ Fiber Optic Cable
W6, W7	TBD	TBD	Encryptor 10/100BaseTX Cable
W11, W21	TBD	TBD	Cisco Ethernet Switch A/B admin Cable
W12	TBD	TBD	Media Converter Y Power Cable
W13	TBD	TBD	TACLANE Power Cable
W14, W33, W34	TBD	TBD	Power Cable, Ethernet Switch and Router
W15, W16, W17, W18	TBD	TBD	Cisco 2950 Ethernet BaseTX Cable
W22, W23	TBD	TBD	Cisco 2621XM Ethernet BaseTX Cable
W24, W25, W26, W27, W28, W29	TBD	TBD	Cisco 2621XM Router Asynchronous Cable
W30, W31	TBD	TBD	Cisco 2621XM Router Synchronous Cable
W32	TBD	TBD	Router Admin Cable
P1, P2	TBD	TBD	10/100BaseTX Red/Black Patch Crossover Cable (stored in pouch)
P3, P4	TBD	TBD	10/100BaseTX Red/Black Patch Straight-thru Cable (stored in pouch)
P5	TBD	TBD	Admin cable, DB9 plug to DB9 jack, 10 ft. (stored in pouch)
P6	TBD	TBD	3-pair Fiber Optic Cable, ST-ST plug, 20 ft. (stored in pouch)

Cable WI				
Pin Assignments				
Media Converter 10BaseT Cable				
RJ45 (SOLID)				RJ45 (SOLID)
Plug				PLUG
10BaseT				Red/Black Patch Panel
Media Converter Port				Couplers
		Signal		
1		TP0+		1
2		TP0-		2
3		TP1+		3
4		TP2+		4
5		TP2-		5
6		TP1-		6
7		TP3+		7
8		TP3-		8

Cable W2			
Pin Assignments			
Media Converter 10/100BaseTX Cable			
	RJ45 (SOLID)		RJ45 (SOLID)
	Plug		PLUG
	10/100BaseTX		Red/Black Patch Panel
	Media Converter Port		Couplers
		Signal	
	1	TP0+	1
	2	TP0-	2
	3	TP1+	3
	4	TP2+	4
	5	TP2-	5
	6	TP1-	6
	7	TP3+	7
	8	TP3-	8

Cable W3, W4			
Pin Assignments			
Media Converter Fiber Optic Cable			
	ST		ST
	Plug		Plug
	Media Converter		I/O DF
	10BaseFL/100BaseFX		
		Signal	Direction
	1	Tx	---->
	2	Rx	<----

Cable W5, W8, W9, W10, W19 & W20					
Pin Assignments					
TACLANE 100BaseFX ST to MT-RJ Fiber Optic Cable					
	MT-RJ			ST	
	PLUG			PLUG	
	TACLANE 100BaseFX			I/O DF Tx/Rx 0	
		Signal	Direction		
	A	TX	---->	B	
	B	RX	<----	A	



Cable W6, W7			
Pin Assignments			
Encryptor 10/100BaseTX Cable			
	RJ45 (SOLID)		RJ45 (SOLID)
	Plug		PLUG
	10/100BaseTX		Red/Black Patch Panel

Encryptor 10/100 Port			Couplers
		Signal	
1	TP0+	1	
2	TP0-	2	
3	TP1+	3	
4	TP2+	4	
5	TP2-	5	
6	TP1-	6	
7	TP3+	7	
8	TP3-	8	

Cable W11,W21 Pin Assignments				
Cisco Ethernet Switch A/B Admin Cable				
	RJ45 (SOLID) Plug			DB09F Receptacle
	2950 Console Console Port			I/O DF I/O DF
		Signal	Direction	
	1	CTS	---->	8
	2	DSR	---->	6
	3	RXD	---->	2
	4	GND		5
	5	GND		5
	6	TXD	<----	3
	7	DTR	<----	4
	8	RTS	<----	7

Cable W12 Pin Assignments				
Media Converter Y Power Cable				
	IEC-320/C-13			IEC-320/C-14

RECEPTACLE					PLUG	
PS1/PS2 Transformer					Power Conditioner-A5	
Power					Power	
		Signal			Direction	
PS1						
1	Line			----	1	
2	Neutral			----	2	
3	GND			----	3	
PS2						
1	Line			----	1	
2	Neutral			----	2	
3	GND			----	3	

Cable W13 Pin Assignments					
TACLANE Power Cable					
	MS27467/T13F4FS				IEC-320/C-14
	RECEPTACLE				PLUG
	TACLANE A1				Power Conditioner A5
	Power				Power
		Signal			Direction
	A	PHASE		----	1
	B	Neutral		----	2
	C	GND		----	3

Cable W14, W33, W34 Pin Assignments				
Power Cable, Ethernet Switch and Router				
IEC-320/C-13 RECEPTACLE		IEC-320/C-14 PLUG		
Ethernet Switch, Router Power		Power Conditioner-A5 Power		
Signal		Direction		
1	Line	----	1	
2	Neutral	----	2	
3	GND	----	3	

Cable W15, W16, W17, W18 Pin Assignments				
Cisco 2950 Ethernet Base TX Cable				
RJ45 (SOLID) Plug		RJ45 (SOLID) PLUG		
10/100Base TX		Red/Black Patch Panel		
Cisco 2924 Ethernet Port		Couplers		
Signal				
1	TP0+	1		
2	TP0-	2		
3	TP1+	3		
4	TP2+	4		
5	TP2-	5		
6	TP1-	6		
7	TP3+	7		
8	TP3-	8		

Cable W22,W23			
Pin Assignments			
Cisco 2621XM Ethernet BaseTX Cable			
RJ45 (SOLID)		RJ45 (SOLID)	
Plug		PLUG	
10/100BaseTX		Red/Black Patch Panel	
Cisco 2621XM Ethernet Port		Couplers	
		Signal	
	1	TP0+	1
	2	TP0-	2
	3	TP1+	3
	4	TP2+	4
	5	TP2-	5
	6	TP1-	6
	7	TP3+	7
	8	TP3-	8

Cable W24, W25, W26, W27, W28, W29				
Pin Assignments				
Cisco 2621XM Router Asynchronous Cable				
	DB60M			DB25F
	Plug			Receptacle
	C2621XM			I/O DISTR FR
	NM-8A/S			
	Serial Port 0-5			
		Signal	Direction	
	J1-41	TxD+	-->	2
	shield			shield
	J1-36	RxD+	<--	3
	shield			shield
	J1-42	RTS+	-->	4
	shield			shield
	J1-35	CTS+	<--	5
	shield			shield
	J1-34	DSR+	<--	6
	shield			shield
	J1-46	Shield_GN D		1
				-
				-
	J1-33	DCD+	<--	8
	shield			shield
	J1-37	TxC+	<--	15
	shield			shield
	J1-38	RxC+	<--	17
	shield			shield
	J1-44	LL	-->	18
	J1-45	Circuit_ GND	-	7
	J1-43	DTR+	-->	20
	shield			shield
	J1-39	TxCE+	-->	24
	shield			shield
	J1-50	MODE_0	Shorted to J1-51	-
	J1-51	GND	Shorted to J1-52	-
	J1-52	MODE_DC E	Shorted to J1-51	

Cable W30, W31 (LFH-D25-025F)				
Pin Assignments				
Cisco 2621XM Router Synchronous Cable				
	DB60M			DB25F
	Plug			Receptacle
	C2621XM NM-4T			I/O DISTR FR
	Serial Ports 6, 7			
		Signal	Direction	
	J1-11	TxD+	-->	2
	J1-12	TxD-	-->	14
	J1-28	RxD+	<--	3
	J1-27	RxD-	<--	16
	J1-9	RTS+	-->	4
	J1-10	RTS-	-->	19
	J1-1	CTS+	<--	5
	J1-2	CTS-	<--	13
	J1-3	DSR+	<--	6
	J1-4	DSR-	<--	22
	J1-46	Shield_GND	Shorted to J1-47	1
	J1-47	MODE_2	Shorted to J1-46	-
	J1-48	GND	Shorted to J1-49	-
	J1-49	MODE_1	Shorted to J1-48	-
	J1-5	DCD+	<--	8
	J1-6	DCD-	<--	10
	J1-24	TxC+	<--	15
	J1-23	TxC-	<--	12
	J1-26	RxC+	<--	17
	J1-25	RxC-	<--	9
	J1-44	LL	-->	18
	J1-45	Circuit_GND	-	7
	J1-7	DTR+	-->	20
	J1-8	DTR-	-->	23
	J1-13	TxCE+	-->	24
	J1-14	TxCE-	-->	11
	J1-51	GND	Shorted to J1-52	-
	J1-52	MODE_DCE	Shorted to J1-51	-

Cable W32				
Pin Assignments				
Router Admin Cable				
	RJ45 (SOLID)			DB09F
	Plug			Receptacle
	Router Console			I/O DF
	Console Port			I/O DF
		Signal	Direction	
	1	RTS	---->	8
	2	DTR	---->	6
	3	TxD	---->	2
	4	GND		5
	5	GND		5
	6	RxD	<----	3
	7	DSR	<----	4
	8	CTS	<----	7

Cable P1, P2			
Pin Assignments			
10/100BaseTX Red/Black Patch Crossover Cable (stored in pouch)			
	RJ45 (SOLID)		RJ45 (SOLID)
	Plug		PLUG
	Ethernet Switch (A) 2924		Ethernet Switch (B) 2924
	10/100BaseTX Ethernet Port		10/100BaseTX Ethernet Port
	1		3
	2		6
	3		1
	4		7
	5		8
	6		2
	7		4
	8		5

Cable P3, P4 Pin Assignments			
10/100BaseTX Red/Black Patch Straight-thru Cable (stored in pouch)			
RJ45 (SOLID) Plug		RJ45 (SOLID) PLUG	
Ethernet Switch (A) 2924 10/100 BaseTX Ethernet Port		Ethernet Switch (B) 2924 10/100 BaseTX Ethernet Port	
	Signal		
	1	TP0+	1
	2	TP0-	2
	3	TP1+	3
	4	TP2+	4
	5	TP2-	5
	6	TP1-	6
	7	TP3+	7
	8	TP3-	8

Cable P5 Pin Assignments			
Admin cable, DB9F plug to DB9M jack, 10 ft. (stored in pouch)			
DB9F Receptacle			DB9M Plug
Laptop COM port Terminal, DTE			I/O DF Various Admin
	Signal	Direction	
2	RD	<----	2
3	TD	---->	3
4	DTR	---->	4
5	GND	----	5
6	DSR	<----	6
7	RTS	---->	7
8	CTS	<----	8

Cable P6				
3-pair Fiber Optic Cable, ST-ST plug, 20 ft. (stored in pouch)				
	ST Plug	3-Pair Fiber Cable		ST Plug
		Signal	Direction	
	1	Tx/0	---->	1
	2	Rx/0	<----	2
	1	Tx/1	---->	1
	2	Rx/1	<----	2
	1	Tx/2	---->	1
	2	Rx/2	<----	2

6.4 Interconnect Diagram

