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SECTION 5
UNIFIED CAPABILITIES PRODUCT REQUIREMENTS

5.1 REQUIREMENTS CATEGORIES AND LANGUAGE

Section 5 of UCR 2008 identifies the minimum functional and performance requirements for products to be placed on the UC APL. Requirements are specified in terms of two categories: Minimum requirements and Conditional requirements.

5.1.1 Minimum Requirements

Minimum requirements are features and capabilities considered necessary for a particular product to support warfighter missions in the DoD. These features and capabilities will require certification before introduction into the DISN.

5.1.2 Conditional Requirements

Conditional requirements are features and capabilities that are not considered critical for DoD mission support based on DoD policies. Nevertheless, it is recognized that such features do have utility for some users or for specific operations. To ensure interoperability and consistency of the Assured Services (AS) across all platforms, these features and capabilities are specified with set parameters. If these features and capabilities are provided, the UC product shall perform and meet the requirements as identified in UCR 2008.

5.1.3 Operational Control over Features and Capabilities

Some features and capabilities are dependent on permission for implementation control.

Vendors shall provide features and functions in accordance with Telcordia Technologies, Internet Engineering Task Force (IETF), and/or other commercial standards unless specifically altered (i.e., added, modified, or deleted) by UCR 2008. Also, those features and functions that are not specified in Telcordia Technologies, IETF, and/or other commercial standards shall optionally be either parameter(s) and/or software controlled whenever practical, especially if the UCR requirement used is conditional, to either permit or not use.

The permission to use these features and capabilities may come from DoD policy and/or base commander decision and shall not be limited by the vendor.

5.1.4 General Requirement Language

The word “REQUIRED” or the term “MUST” or “SHALL” means the definition is an absolute requirement of the product.

The word “CONDITIONAL” or the term “MAY” means an item is optional.

The phrase “MUST NOT” or “SHALL NOT” means the definition is an absolute prohibition of the item.

The word “RECOMMENDED” means the reference is given as guidance and is not a testable requirement.

The phrase “THE NETWORK,” referenced in Telcordia Technologies Local Access and Transport Area (LATA) Switching Systems Generic Requirements (LSSGR), shall mean the DSN network.

5.1.5 AS-SIP Requirement Adheres to IETF Specification Language

The AS-SIP requirement of UCR 2008 is built on IETF Requests for Comment (RFCs). The AS-SIP requirement therefore adheres to the IETF terminology that uses terms or key words including: “MUST,” “MUST NOT,” “REQUIRED,” “SHALL,” “SHALL NOT,” “SHOULD,” “SHOULD NOT,” “RECOMMENDED,” “NOT RECOMMENDED,” “MAY,” and “OPTIONAL.” These terms indicate requirement levels for compliant SIP implementations and are to be interpreted as described in IETF BCP 14, RFC 2119.

5.2 CUSTOMER PREMISE EQUIPMENT AND LEGACY INTERFACES

For the circuit-switched interfaces associated with UC IP products like gateways, LSCs, and MFSSs, Section 5.2 of UCR 2008 (signed 22 January 2009) provides the specifications. However, with few exceptions, all circuit-switched/TDM products will no longer be tested for APL status as of the signature date of UCR 2010. Exceptions to this policy will be submitted through the appropriate channels for ASD(NII) consideration.

5.2.1 Echo Canceller Requirements

5.2.1.1 General Description

Echo cancellers are voice-operated devices used to minimize echo in circuits containing hybrids that convert 4-wire to 2-wire connections. They compensate for the effect of high, E2E delay that results in unacceptable voice listening performance. In general, echo cancellers (ECs) are needed on long terrestrial trunks and on all trunks routed via satellite. They mitigate echo mainly by estimating the voice signal's pattern, making a model of that pattern, storing it, and subtracting it from the echo returning from the distant end, while leaving intact the information flow coming from the distant end. Echo cancellers may be implemented as standalone devices or integrated into the transmission interfaces of switches, or other network devices.

5.2.1.2 Requirements

This section provides the requirements for ECs in the DSN.

5.2.1.2.1 General Requirements

[Required] The EC shall meet the requirements of ITU-T Recommendations G.165 and G.168, and Telcordia Technologies SR-2275, Section 7, *Transmission.*

[Required] The EC shall support at least 64 ms echo tail length.

[Required] The mean opinion score (MOS) technique, if applicable, and the perceptual evaluation of speech quality (PESQ) measurement, ITU-T Recommendation P.862, shall be used to assess the clarity of E2E voice circuits on which ECs are installed. The voice quality shall have an MOS of 4.0 or better, as measured in accordance with DISR voice quality standards.

[Required] The EC shall be able to determine when a new call is being established and apply echo cancellation in accordance with this section.

[Required] The EC shall have, at a minimum, the following two operational states and they shall be settable by the network management system (NMS) (see Section 5.2.1.2.7, Device Management), local control interface, or front and/or back control panel on a per DS0 basis:

1. Normal. Echo cancellation will remain in the enabled state between calls and during calls unless it is disabled as defined in this section.

2. Forced Off. In this state, the EC shall not enable echo cancellation until the forced off state has been changed.

5.2.1.2.2 2100-Hertz EC Disabling Tone Capability

[Required] On a per-channel basis, a 2100 Hz disabling tone shall be recognized by the EC, causing the EC to disable, as specified in ITU-T Recommendation G.168.

[Required] Re-enabling the EC, after the echo cancellation function has been disabled by the tone, it shall remain in a disabled state until one of the following events occurs:

1. No single-frequency sinusoid is present as defined in ITU-T Recommendation G.168, Section 7.

2. The end of the call is detected.

3. The end of data transmission is detected. This may be detected either by the lack of modem or fax tones on the channel, or by some proprietary method.

[Required] Echo cancellers shall be capable of determining when a channel is in use (i.e., a call is active on the channel) or not. This function shall not interfere in any way with an active call.

[Required] The 2100-Hz disabling tone shall override all other control functions and shall disable echo cancellation for that particular call.

5.2.1.2.3 EC Hardware

[Required] The EC shall be able to be connected to either analog and/or digital transmission facilities.

[Conditional] An analog trunk interface shall be able to provide echo cancellation on a per-trunk basis.

[Conditional] A digital trunk interface shall be implemented on a digital basis without conversion to analog. The digital EC shall treat all DS0 channels (i.e., PCM-24, PCM-30, or more for SONET) independently.

5.2.1.2.4 Echo Cancellation on PCM Circuits

[Required] The PCM-24 or PCM-30 interfaces shall be in accordance with the requirements in UCR 2008, Section 5.2.6, System Interfaces, as applicable for the interface.

[Required] When the bearer channel is used for 56 or 64 kbps digital data or submultiples of 64 kbps, the digital ECs shall not cause a loss of bit integrity.

[Required] Echo cancellers inserted in a PCM-24 path using CAS (i.e., "robbed bit") shall have a selectable setting to exclude the signaling bits from the cancellation process.

[Required] The echo canceller shall be capable of performing echo cancellation for speech and audio bearer capability calls on the full 64 kbps signal.

[Required] Echo cancellers shall not interfere with the functionality of CCS7 continuity check tones.

5.2.1.2.5 External ECs – Not Controlled

[Conditional] Echo cancellers that are placed on network facilities and are not controlled by a switch or adjunct controller shall be able to determine whether a new call is a voice or data call. For voice calls, echo cancellation shall be enabled, and for data calls echo cancellation shall be disabled.

5.2.1.2.6 Integral ECs – Controlled

[Conditional] Echo cancellers that are placed on network facilities and are controlled by a switch or adjunct controller shall enable or disable its echo cancellation capability based on input from the local switch or adjunct controller. The EC shall receive this input via a direct connection to the switch's or adjunct controller's internal messaging pathways, or by using an external communications port. For voice calls, echo cancellation shall be enabled, and for data calls, the echo cancellation shall be disabled.

5.2.1.2.7 Device Management

[Required] All EC devices in the DSN will be monitored and managed by the ADIMSS, as described in UCR 2008, Sections 5.2.8, Network Management, 5.2.8.3, Fault Management, and 5.2.8.4, Configuration Management.

[Required] Echo cancellers shall be capable of performing a self-test diagnostic function on nonactive and active channels on a noninterference basis and report any failures to the assigned NMS.

[Conditional] If the EC is not considered an integral part of the switch or larger functional entity, then a front or back panel and/or external console control capability shall be provided for local management.

[Required] The EC shall program its echo cancellation capability based on input via a direct connection to the external communications port, or using the front and/or back programming panel, or by switch datafill.

5.2.1.2.8 Reliability

[Required] The EC reliability and availability shall conform to Section 5 of Telcordia Technologies GR-512-CORE, as specified for individual devices. The vendor shall provide a reliability model for the system, showing all calculations along with how the overall availability will be met, if requested.

5.2.1.3 EC Application Guidelines

This section describes the application of EC devices in the DSN and provides information only (see Figure 5.2.1-1, EC Applications in the DSN).

The need for echo control devices becomes apparent as the round-trip delay of the facilities used totals more than 30 ms. An EC is actually required at both ends of the PCM or analog transmission system when the round-trip delay is greater than 20 ms. While round-trip delays of less than 30 ms are tolerable to normal telephonic speech and not perceived by the user as an echo condition, this quantity of delay results in a noticeable “hollowness” to the circuit, as though the caller were talking in a reverberant room or tunnel. If the DSN were only a fraction of its current size and complexity, individual trunks that cause the delay could be singled out and provided with echo control. Nevertheless, because of the complexity of all possible connections in a global switched network, the delay introduced by digital processing, and the physics of how an EC functions, a different approach must be taken.

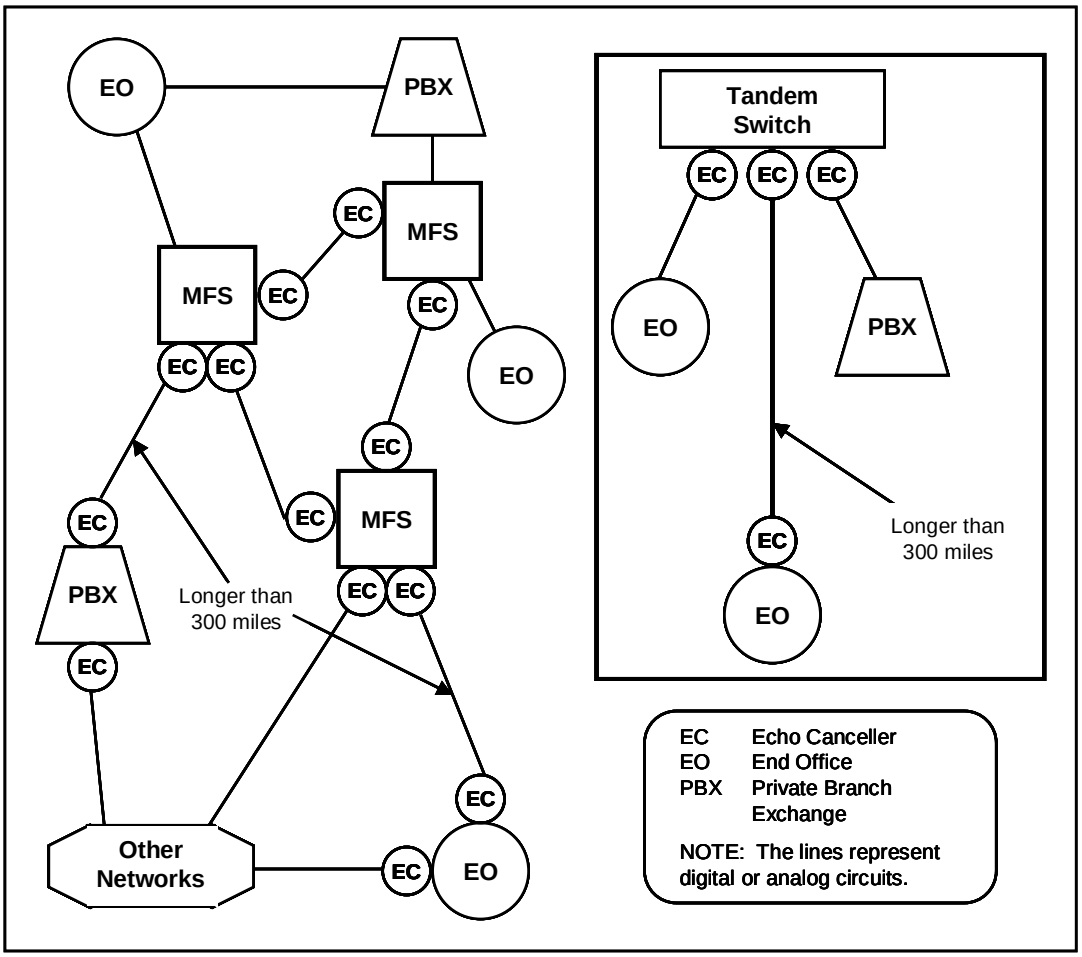

Figure 5.2.1-1. EC Applications in the DSN

5.2.1.3.1 EC Placement

Echo cancellers may be placed on the:

1. Multifunction switch end of all circuits interconnecting with MFSs or standalone switches (SAS). This configuration allows for the echo cancellation for calls terminating on the MFS or calls terminating at close in (i.e., less than 300 miles distant) EO switches or PBXs.

   a. The tandem switch end of all circuits interconnecting EOs or PBXs with the SAS

   b. Both ends of all circuits over 300 miles in length interconnecting or PBXs with MFSs or SASs

   c. The MFS, EO, or PBX end of all circuits interconnecting with networks other than the DSN

5.2.1.3.2 Additional Guidance

End office and PBX ECs need a minimum (typically 8 ms) end-path delay capability. Each MFS configuration requires that the end-path delay be computed for all subtending EOs and PBXs, other than those providing their own ECs under the 300-mile rule. An end-path delay capability greater than the highest end-path delay figure (from the computations) will be standard for all ECs on a particular MFS.

5.2.1.3.3 Exceptions

Best engineering judgment may be applied to EC placement in special cases where many MFSs are in close proximity and the provisioning of ECs on all MFS-to-MFS trunks is not cost effective. However, placing ECs only on egress circuits to a DSN switch cluster or enclave increases the end-path delay capability required for the "gateway" ECs. The possibility of intraenclave circuit tandeming between the EC and the furthest possible (in terms of delay) enclave hybrid complicates the determination of the required end-path delay capability. The added complexity is due to the many possible intra-enclave paths and the cumulative delay of a series of switches and multiplexers. If the longest (in terms of delay) possible end-path delay route is not accurately identified, the calculated end-path delay capability may be too small to effectively cancel echo for all possible circuit connections.

5.2.2 DSN Switch SONET Digital Trunk Interface

5.2.2.1 General Description

This section describes the requirements that must be met by all circuit-switched SONET Digital Trunk Interfaces (SDTIs) for them to be certified and used in the DSN. All services, features, and functions (both unique military and standard commercial) identified in this section are to be implemented in DSN SDTI. This requirement also applies to upgrades and new software loads for existing SDTI equipment.

This section complies with Telcordia Technologies GR-782-CORE, a module of TSGR, FR-440, GR-513-CORE, and a module of the *LSSGR, FR-64*, Telcordia Technologies, GR-782-CORE for an OC-3 (or STS-N) interface to a DSS to be used in the DSN trunk networks. The typical SDTI functions are described as pertaining to the DSN intraoffice environment. The DSN intraoffice environment is viewed as a facility that contains at least one DSN center. Unless otherwise specified, it is assumed that the SDTI is in the intraoffice environment. An interoffice SDIT is optional. It is assumed that, most of the time, the SDIT will be connected to an add-drop multiplexer (ADM) or wideband digital cross-connect system (WDCS) in the same office, via an intraoffice connection. It is further assumed that the majority of the performance monitoring will be done within the transport network (i.e., at ADMs and WDCSs). Thus, for an intraoffice connection, the switch interface unit will not need to process several of the overhead bytes

because they will have already been processed by an ADM or WDCS before the signal arrives at the switch. Therefore, this section takes into account two switch interface types: an intraoffice interface and an interoffice interface, where the latter processes the overhead as in the transport network. This document complements Telcordia Technologies GR-253-CORE, which describes the SONET signal hierarchy and formats that include common criteria for the SDTI and other SONET network elements (NEs). Therefore, common criteria are referenced in GR-253-CORE and are not repeated in this section unless they are considered to be a part of the required MUF features and functionalities. The criteria for the interoffice switch interface comply with GR-253-CORE; however, the criteria for the intraoffice switch interface differ from GR-253-CORE because the switch interface is not addressed as a transport device. This section, which addresses the SONET interface for the trunk side of a digital switch, is distinct from Telcordia Technologies GR-303-CORE.

5.2.2.2 Requirements

This section provides the requirements for switch SDTIs in the DSN. All switch SDTIs are required to meet the following requirements.

5.2.2.2.1 MUFs

[Required] The features and functions identified in this document shall support the full complement of MUFs to include CAS, ISDN NI-1/2, and DSN backbone using CCS7.

5.2.2.2.2 Interface

[Required] The SONET interface shall be in compliance with Telcordia Technologies GR-303-CORE for an OC-3 interface between an Integrated Digital Loop Carrier (IDLC) system's remote digital terminal and the line side of a local digital switch.

[Required] The SONET interface shall meet the requirements of Telcordia Technologies GR-253-CORE and GR-782-CORE.

[Required] The criteria for the various SONET optical and electrical interfaces shall conform to GR-253-CORE. Such an interface shall also comply with Telcordia Technologies GR-303-CORE.

[Required] The SDTI, at a minimum, shall comply with ANSI T1.105-2001.

[Required] All features and functions defined in the UCR 2008 to operate at a DS1 rate shall work transparently at the VT1.5 rate over the SONET interface.

[Required] The SONET digital interface shall support provisioning of transport levels as low as the DS1 rate for grouping of various categories of traffic separately ,such as voice, data, satellite, and terrestrial transmission.

[Required] The SDIT shall be capable of DS0 call processing and routing, and shall route the DS0s within a VT1.5 in a way that presents the DS0s to the DSN for processing.

5.2.2.2.3 ROUTE Assignment

[Required] The SDTI shall support "ROUTE" assignment of trunk group(s) at the OC-3 (highest) and down to DS0 (lowest) rates as defined in UCR 2008, Section 5.2.3.2, Primary and Alternate Routing, and shall support the signaling requirements as shown in UCR 2008, Table 5.2-1, Trunk Types and Signaling Used in the DSN (Includes Legacy Interfaces).

5.2.2.2.4 Facility Alarms

[Required] The SDTI shall provide maintenance signals that include the following failure states, defined in Telcordia Technologies GR-253-CORE, for loss of signal, loss of frame, loss of pointer, and equipment failures.

- Line Alarm Indication Signal (AIS)
- Line RDI-L
- Synchronous Transport Signal (STS) Path AIS
- STS Path Yellow
- VT Path AIS
- VT Path Yellow

Code processing is necessary for all applications for maintenance-related activities.

[Required] The SDTI shall conform to Telcordia Technologies GR-782-CORE, Section 7.2, for AIS and Yellow signal processing to include signal processing for rates as low as DS1.

[Required] The SDTI shall process DS0 AIS and transmit DS0 RAI (Yellow) in accordance with Telcordia Technologies GR-253-CORE.

5.2.2.2.5 Synchronization

[Required] The SDTI shall meet the common synchronization requirements specified in Telcordia Technologies GR-253-CORE, GR-518-CORE, and GR-436-CORE.

[Required] The SDTI shall meet the sinusoidal jitter tolerance requirements specified in Telcordia Technologies GR-253-CORE. The SDTI falls under Category II in GR-253-CORE.

[Required] The SDTI shall meet the jitter generation requirements specified in Telcordia Technologies GR-253-CORE.

[Required] The SDTI shall meet the generic wander requirements per Telcordia Technologies GR-253-CORE, and shall be able to accommodate at least 10 msec of wander over a 24-hour period (the maximum amount of wander expected to appear at these interfaces).

[Required] As defined in Telcordia Technologies GR-782-CORE, Section 6.6, the 24 DS0 (VT1.5) signals not using out-slot signaling shall have an all "zeros" idle code inserted into the appropriate signaling bit positions within the VT1.5 stream. A mixture of DSN CCS and out-slot signaling may exist on a VT1.5 basis in an OC-3 interface as DSN CCS evolves. Therefore, both DSN CCS and out-slot signaling are required.

5.2.2.2.6 Reliability

[Required] The SDTI shall meet the requirements contained in Telcordia Technologies GR-874-CORE, and the requirements for switching systems specified in Telcordia Technologies TR-NWT-000284. Also, the SDTI shall conform to the reliability objectives for switching systems, including integrated digital terminations, as specified in Telcordia Technologies GR-512-CORE.

5.2.3 Customer Premises Equipment Requirements

5.2.3.1 General Description

A wide variety of CPE manufactured and sold by many sources can be connected to the line-subscriber and/or carrier-network side of a DSN switching center. Such varieties include industry "ANSI-ETSI Standards" based digital and analog devices and non-Standards based proprietary digital devices. The efficiency of such analog devices or equipment in converting an acoustic signal into an electric signal (and the reverse) is an important consideration in the development of the DSN transmission plan. The efficiency of the analog or digital CPE equipment affects the quality, loudness, noise, and echo performance of the overall connection.

This section covers those devices that are connected to a DSN switch via a 2-wire analog, 2-wire digital, or 4-wire digital interface (as illustrated in Figure 5.2.3-1, Typical CPE Connections to the DSN) and that such devices are not required to have NM features or functionality. This covers devices such as answering machines, voice mail, automated call distributors, proprietary telephone sets, standards-based telephone sets, facsimile machines, voice band modems, ISDN network termination 1 (NT1) devices and terminal adapters (TAs), and certain devices that are deemed mandatory for local or host nation telecommunications network compliance (i.e., 911 emergency service).

The original interface requirement for a 911 emergency service system is typically an analog protocol that requires R2 signaling. Since the basic requirements of the UCR did not mandate the R2 signaling, it is therefore not a DSN requirement for such a system that uses the R2 protocol. The DSN, however, supports such a system via the ISDN BRI/PRI protocol and this section applies to all 911 emergency service system(s) using the ISDN protocol.

The listed interfaces are described in more detail in the following paragraphs with the minimum features that are essential for maintaining the DSN QoS. The CPEs that are designed to actively control the interaction of switch supervision are further described to make a distinction between manual and automated CPE supervision control (i.e., fax and modems versus analog and digital 2-wire subscriber instruments) to ensure MLPP transparent operation.

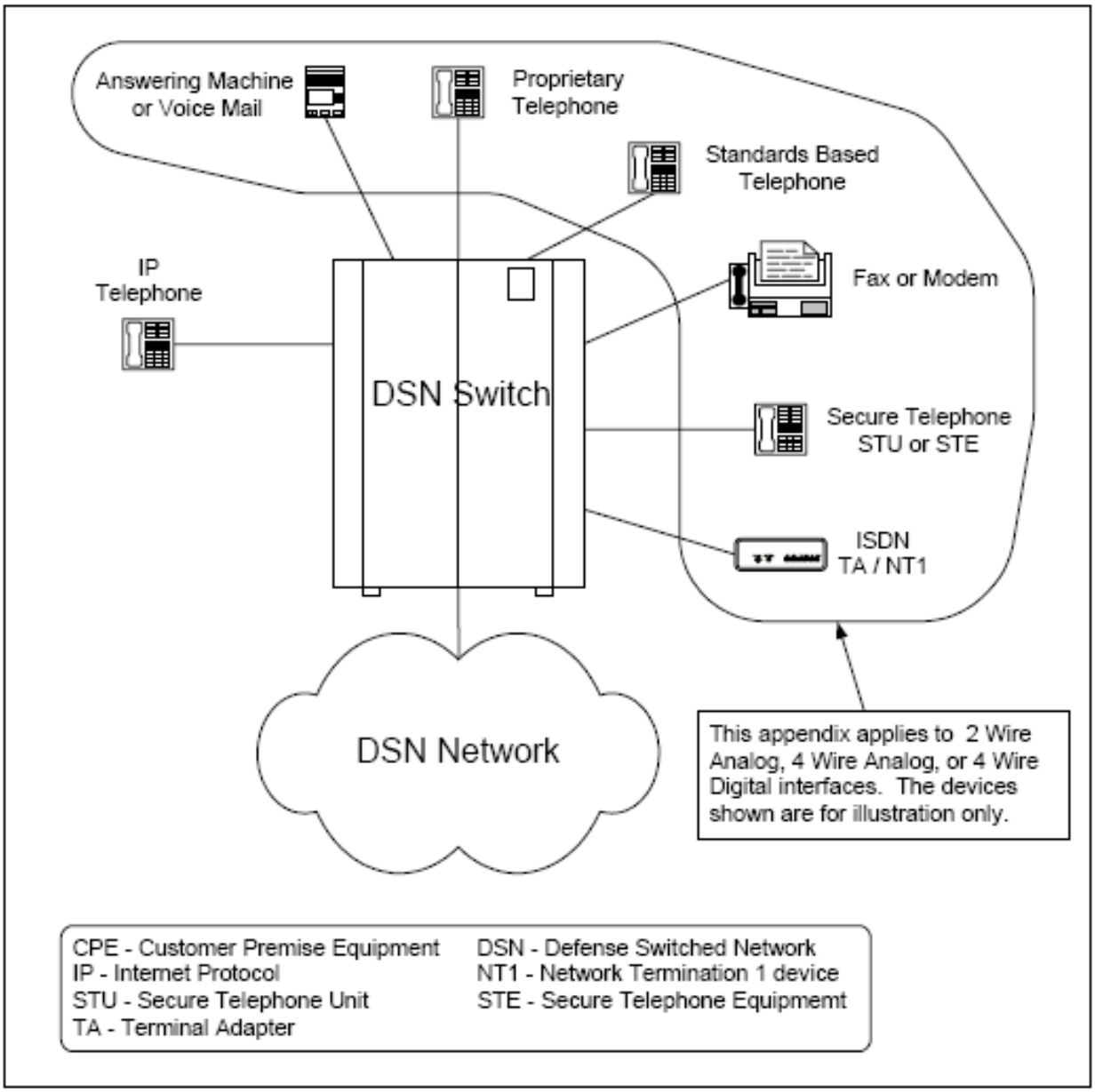

Figure 5.2.3-1. Typical CPE Connections to the DSN

Figure 5.2.3-2, ISDN Reference Points, illustrates the ISDN-specified reference points and the arrangement of terminal equipment. The reference points applicable for DSN CPE are as follows:

U The reference point for a BRI connection between a local loop and a customer premise. The U interface specifies a single pair loop over which a logical 4-wire circuit is derived.

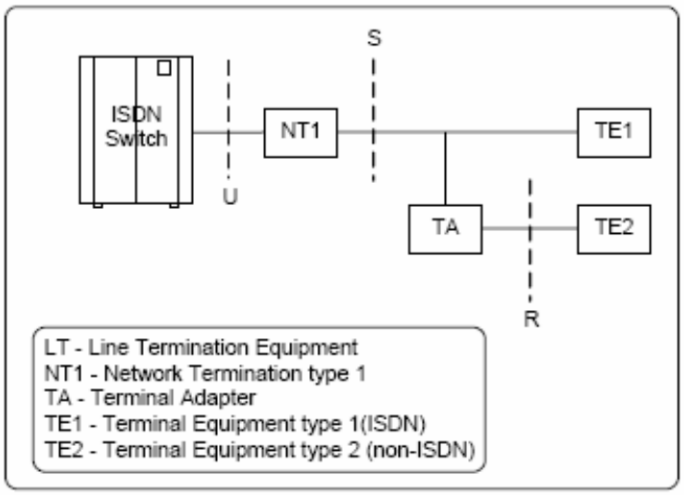

Figure 5.2.3-2. ISDN Reference Points

S The reference point between ISDN user terminal equipment (i.e., Terminal Equipment 1 (TE1) or TA) and the network termination equipment (NT1). This is a 4-wire interface that supports the BRI 2B+D protocol.

R The reference point representing a standardized non-ISDN interface, such as EIA-232, EIA-422, V.24, and V.35. The combination of a TA and Terminal Equipment 2 (TE2) is equivalent to a TE1.

5.2.3.2 Requirements

All CPE devices covered by this section are required to meet the following requirements:

[Conditional] All CPE devices that support MLPP shall do so in accordance with the requirements listed in UCR 2008, Section 5.2.2, Multilevel Precedence and Preemption, and shall not affect the DSN interface features and functions associated with line supervision and control.

[Required] All DSN CPE, as a minimum, must meet the requirements of Part 15 and Part 68 of the FCC Rules and Regulations, and the Administrative Council for Terminal Attachments (ACTA).

[Conditional] A device(s) that supports auto-answer shall have an "auto-answer" mode feature allowing the auto-answer mode to be set to a "time" more than the equivalency of four ROUTINE precedence ring intervals in accordance with UCR 2008, Section 5.2.2.3, Precedence Call Diversion, before "answer" supervision is provided. Handling of the precedence calls will be in accordance with UCR 2008, Section 5.2.2.2.4.2, Precedence Calls to Non-MLPP Networks.

[Conditional] Devices that are required to support precedence calls above ROUTINE precedence shall respond properly to an incoming alerting (ringing) precedence call cadence as described in UCR 2008, Section 5.2.4.5.1, Ringing.

[Conditional] A device(s) that can "out dial" DTMF and/or DP digits (automatic and/or manual) shall comply with the requirements in UCR 2008, Section 5.2.4.4.1, Dial-Pulse Signals, and Section 5.2.4.4.2, DTMF Signaling, respectively, for its address digit-generating capabilities and shall be capable of outpulsing DTMF digits specified in Telcordia Technologies GR-506-CORE.

[Conditional] Modems and facsimile machines shall be compatible with ITU and Telcordia standards, as applicable.

[Conditional] Facsimile devices, as a minimum, shall meet the requirements in accordance with applicable DISR standards.

[Conditional] If Configuration Management and/or Fault Management are provided by the CPE device so that it can be managed by the ADIMSS or other management systems, then the management information shall be provided by one or more of the following serial or Ethernet interfaces:

1. Serial interfaces shall be in accordance with one of the following standards:

    a. ITU-T Recommendation V.35
    b. TIA-232-F
    c. EIA-449-1
    d. TIA-530-A

2. Ethernet interfaces shall be in accordance with IEEE 802.3-2002.

[Conditional] As a minimum, the 911 and the E911 (tandem) emergency service shall have the capability to "hold" the originating subscriber or caller from releasing the call via the switch supervision interaction for line and trunk control by the "called-party" feature, in accordance with Telcordia Technologies GR-529-CORE.

5.2.3.2.1 2-Wire Analog Instruments and Devices

The CPE(s) that connect to the DSN using a 2-wire analog interface (i.e., analog single-line instrument, fax, modem, answering machine, voice mail, automated call distributor) shall meet the following requirement:

[Required] All 2-wire analog devices shall conform to the requirements of TIA/EIA-470-B.

5.2.3.2.2 2-Wire Digital Instruments and Devices

The CPE(s) that connect to the DSN using a 2-wire digital interface (i.e., digital single or multiline proprietary instrument, fax, modem, ISDN BRI devices including 911 emergency services) shall meet the following requirements:

[Conditional] The CPE(s) that use loop signaling shall conform to the requirements of TIA/EIA-470-B.

[Conditional] The CPE(s) that connect at the ISDN BRI "U" interface shall conform to ANSI T1.601-1999.

5.2.3.2.3 4-Wire Digital Instruments and Devices

[Conditional] The CPE(s) that connect at the ISDN BRI "S" or "T" interface shall conform to ANSI T1.605-1991 (R1999).

5.2.3.2.4 ISDN TA

The general function of a TA is to adapt terminals with non-ISDN standard interfaces (e.g., X-series and V-series interfaces) to ISDN standard user-network interfaces. The TA shall adapt to, connect to, and/or be part of a data-type terminal. The TA connects terminal equipment (TE2), such as a computer, fax machine, LAN, and telephone set, to one or more B channels and passes along digital signals to the ISDN external line. A TA need not be a separate unit but could be contained within the TE or integrated with the NT1 into a single box. Terminal adapter(s) shall meet the following requirements:

1. **[Required]** The TA shall be able to connect a non-ISDN terminal (TE2) to one or both of the B channels of an ISDN connection and establish a viable ISDN connection with a terminal at the distant end.

2. **[Required]** The TA shall meet its necessary requirements regardless of whether it is implemented as a standalone device or as a device integrated with either the TE2 it supports or the NT1 that connects it to the network.

3. **[Required]** The TA shall be compatible with national ISDN NI-1/2 as defined by UCR 2008, Section 5.2.1.3.3, National ISDN 1/2 Basic Access.

4. **[Conditional]** The TA shall provide loopback capability in accordance with ITU Recommendation V.54.

5. **[Conditional]** The TA shall support inverse multiplexing in accordance with ITU Recommendation H.244, and conform to Federal Telecommunications Recommendation (FTR) 1080B-2002, when connected to TE2 equipment.

6. **[Required]** The TA shall provide one or more of the following interfaces:

    a. EIA-366-A
    b. EIA-449-1
    c. TIA-530-A
    d. ITU-T Recommendation V.35

5.2.3.2.5 Automated Receiving Devices

Automated Receiving Devices (ARDs) are a family of automated devices, which are CPE or NEs, that attaches to the receiving end of a telephone call. Typical ARDs will have an automatic call distribution front-end, which could be as simple as a queue that handles incoming calls on a first come first serve basis. The ARDs that are more complex can be full function Automatic Call Distributors (ACDs) that include predetermined schemes and route calls based on routing criteria and, quite often, database handling instructions. Once in queue, if the call is not answered in a specified amount of time, and if the caller had not terminated the call, ARDs can also terminate the call, or send the call to another location. Usually, ARDs invoke a network carrier based "take back and transfer" to the alternative location. Generally, ARDs do not originate calls to the network.

The ARDs can have different names. The following are some typical devices included in this family:

- ACD
- Voice messaging system
- Automatic announcer
- Event notification system
- Automated attendant
- Morale, welfare, and recreation (MWR) call systems
- Call center system

The ARDs shall meet the following minimum requirements:

1. **[Required]** The ARD interfacing to the DSN shall provide at least one of the following interface types:

    a. A 2-wire interface as specified in Section 5.2.3.2.1, 2-Wire Analog Instruments and Devices, and/or Section 5.2.3.2.2, 2-Wire Digital Instruments and Devices.

b. A 4-wire interface as specified in Section 5.2.3.2.3, 4-Wire Digital Instruments and Devices.

c. PCM-24 as specified in UCR 2008, Section 5.2.6.1, PCM-24 Digital Trunk Interface.

d. PCM-30 as specified in UCR 2008, Section 5.2.6.2, PCM-30 Digital Trunk Interface.

5.2.3.2.6 Remote Access

These requirements are for calls attempting to access or leave the DSN via an ARD.

[Required] The Remote Access feature shall meet the overall requirements of an ARD (Section 5.2.3.2.5, Automatic Receiving Devices).

[Required] The ARD shall receive calls, provide an alerting message or tone to alert the caller to dial additional digits, and screen those digits to permit or restrict extending the call (Telcordia Technologies SR-504, Section 02-01-0150).

[Required] The ARD shall use a caller provided personal identification number (PIN) and/or authorization (Auth) code (a minimum of five digits for either with a failure of three attempts will result in a disconnect) and/or a system-provided ANI. Any combination of screening features may be used to screen incoming callers for access permission and call extension control. This feature can be either enabled or disabled by an administrator.

[Required] The ARD shall verify that the ANI and/or PIN or Auth code is not already in use on another call, thus preventing unauthorized use of the ANI and/or PIN or Auth code. This feature can be either enabled or disabled by an administrator.

5.2.4 Video Teleconferencing Requirements

5.2.4.1 General Description

The DSN provides an implementation of non-MLPP and MLPP ISDN that can be used for E2E digital VTC systems in secure or nonsecure modes at any level of precedence. The DSN uses an intelligent signaling network and a limited set of user-network interfaces. The DSN implementation of ISDN will allow for the integration of voice, data, video, text, and graphics communications. The DSN is capable of two ISDN standard interfaces identified as:

- BRI
- PRI

Video teleconferencing systems and end points connected to the DSN may incorporate the following:

- Camera, monitor, microphone, and speakers
- Codec
- MCU
- H.323 to H.320 Gateway
- Cryptographic device/cryptographic device bypass unit
- Other similar equipment

The H.323 AS requirements have not been finalized yet, so the H.323 interface currently has no AS capabilities. This interface can only serve DoD, non-DoD, non-governmental, and foreign government users having no missions or communications requirement to ever originate or receive C2 VTC communications under existing military scenarios. These users are provided access to the DSN for the economic or policy benefits of the DoD, when it is not in conflict with local PTT ordinances. Since H.323 does not provide AS during a crisis or contingency, users' access to the DSN will be on a best effort basis. Therefore, I/P VTC users and FO/F VTC users are not authorized to be served by an H.323 interface.

These devices may be implemented as individual components or be integrated with one or more other components as a system. The terms VTC, VTC system(s), and VTC end point(s) are used synonymously.

The VTC systems and/or end points are typically connected to the DSN via an Integrated Access Switch/System (IAS) (see Section 5.2.6, IAS Requirements, for DSN IAS requirements) or a TA (see, Section 5.2.3, Customer Premises Equipment Requirements, for DSN TA requirements). This requirement also addresses VTC systems and/or end points that have an integral IAS or TA for connection to the DSN. In addition to the requirements specified in this section, VTC systems or devices that have integral IAS and/or TA functions shall conform to the stated requirements identified in Section 5.2.6 and Section 5.2.3, as applicable.

Figure 5.2.4-1, Typical VTC System connections to DSN, shows typical connections between VTC systems and/or end points and the DSN. Other connection configurations may be possible.

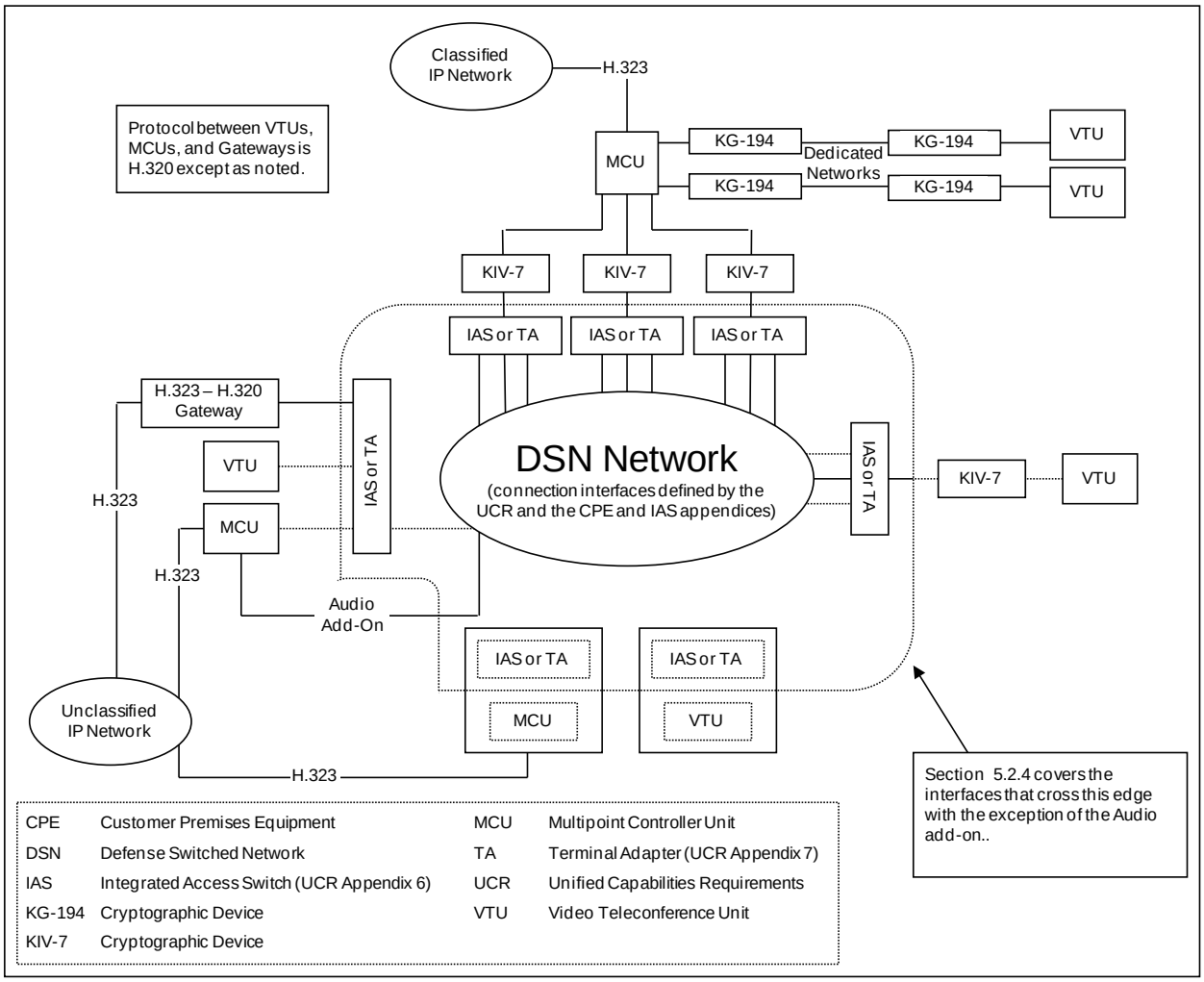

Figure 5.2.4-1. Typical VTC System Connections to DSN

5.2.4.2 VTC Requirements

This section provides the requirements for VTC systems and/or end points in the DSN. All VTC systems and /or end points, when interfaced to the DSN, are required to meet the following requirements:

1. **[Required]** The VTC system and/or end points shall meet the requirements of FTR 1080B-2002.

2. **[Conditional]** The VTC features and functions used in conjunction with IP network services shall meet the requirements of H.323 in accordance with FTR 1080B-2002. Also, H.323 video EIs must meet the tagging requirements as specified in Section 5.3.1, ASLAN Infrastructure Product Requirements.

3. **[Required]** A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference.

4. **[Conditional]** An audio add-on interface, implemented independently of an IAS, shall be in accordance with UCR 2008 and in particular, Section 5.2.3, Customer Premise Equipment Requirements.

5. **[Conditional]** A VTC system and/or end point that uses an integrated BRI interface to connect to the DSN shall be in conformance with the requirements associated with a TA as described in Section 5.2.3, Customer Premise Equipment Requirements.

6. **[Conditional]** A VTC system and/or end point that uses an integrated PRI interface to connect to the DSN shall be in conformance with the requirements associated with an IAS as described in Section 5.2.6, IAS Requirements.

7. **[Conditional]** A VTC system and/or end point that uses a serial interface(s) to another device, such as a cryptographic device, IAS, or TA, for eventual connection to the DSN, shall be in conformance with the requirements for that serial interface(s) as described in FTR 1080B-2002.

8. **[Required]** Physical, electrical, and software characteristics of a video teleconferencing unit (VTU) system(s) and/or end point(s) that are used in the DSN network shall not degrade, or impair, the serving DSN switch and its associated network operations.

5.2.5 DoD Secure Communications Devices

5.2.5.1 General Description

This section describes the requirements that will be used to certify DoD Secure Communications Devices (DSCDs) when directly connected to or otherwise traversing the DSN, the PSTN, or the DRSN Gateway to or from the DSN.

This section applies to the secure mode operation of any DSCD that either directly connects to the DSN, the PSTN, or the DRSN Gateway, or traverses these networks in the course of conducting a secure communications session, regardless of where the telephone call originates or terminates. The certification test environment for DSCDs shall include configurations that realistically simulate fixed networks (i.e., DSN, DRSN via the DSN Gateway, PSTN) and deployed networks, such as DVX systems and other configurations as defined by the Executive Agent for Theater Joint Tactical Networks, or any combination thereof.

5.2.5.2 Requirements

The JITC will validate all the features and capabilities of a DSCD device, to include voice, data, and facsimile transmission.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] The enabled DSCD shall be only those that are Type Approved by NSA and are listed on the NSA Secure Product web site. Each DSCD must support at least one NSA approved secure protocol. If the DSCD supports more than one secure protocol, it must meet all the requirements for at least one of the secure protocols, and must minimally support the other protocols that are provided on the DSCD.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] The DSCD devices that use a 2-wire analog or BRI interface shall meet the EI requirements as specified in Section 5.2.3, Customer Premises Equipment Requirements. The DSCD devices that use an IP interface shall meet the EI requirements as specified in Section 5.3.2, Assured Services Requirements.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] A DSCD device that supports one of the required signaling modes shall interoperate with and establish secure sessions with other compatible devices with at least an 85 percent secure call completion rate.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] The DSCD shall be capable of using the protocol(s) provided to establish a secure session within 60 seconds and must maintain secure communications for the duration of the secure portion of the call.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] The DSCD shall operate in a network that has an E2E latency of up to 600 milliseconds.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] The DSCD shall achieve and maintain a secure voice connection with a minimum MOS of 3.0.

[Required: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] Once connected to the rekey center, the DSCD shall obtain a new key and properly process that new key with a 95 percent rekey completion rate.

[Conditional: STE Enabled DSCD, FNBDT/SCIP Enabled DSCD] The DSCDs that establish secure sessions on a Continuously Variable Slope Delta (CVSD) switch and terminate on a CVSD switch, without ever traversing or otherwise interacting with the DSN, DRSN, or PSTN must do so with a 50 percent completion rate.

[Conditional: FNBDT/SCIP enabled DSCD] The DSCDs that establish secure sessions on IP networks using FNBDT/SCIP shall satisfy all of the end point requirements described SCIP-215 and SCIP-216.

[Conditional: STE and FNBDT/SCIP Enabled DSCD] The DSCD devices shall support a minimum data rate and facsimile transmission rate of 9.6 kbps.

5.2.6 IAS Requirements

5.2.6.1 General Description

This section describes the requirements that must be met by all IAS CPE devices for them to be certified and used in the DSN. An IAS is an ISDN device with one or more PRI interfaces to a DSN switch. It will only be used to support video and data services.

5.2.6.2 IAS Requirements

The IAS is a CPE system that interconnects a DSN switch and terminal equipment (TE), such as Inverse Multiplexers (IMUXs), routers, VTC codecs, VTC monitors, and MCUs (see Figure 5.2.6-1, Typical Connections for an IAS). The IAS is able to originate multiple data and/or video calls in accordance with the WWNDP, described in UCR 2008, Section 5.2.3.5.1, DSN Worldwide Numbering and Dialing Plan. Depending on the local implementation, PRI to PRI, PRI to BRI, or BRI to PRI, interconnection is accomplished by the IAS. The IAS does not possess any functions of MLPP, but shall be able to originate calls that can be interpreted by the DSN switch as precedence calls and may be preempted on the DSN switching platforms and network trunks (see Figure 5.2.6-2, MLPP Implementation and the IAS). The IAS shall be provisioned so that the number of provisioned TE interface bearer channels shall not exceed the number of provisioned DSN or commercial interface bearer channels. This is to reduce the possibility of a call destined for a TE from being blocked by the DSN or commercial interfaces on the IAS not having available bearer channels for the call. NOTE: A VTC call inherently has a ROUTINE precedence level. A typical layout of the IAS is illustrated in Figure 5.2.6-1.

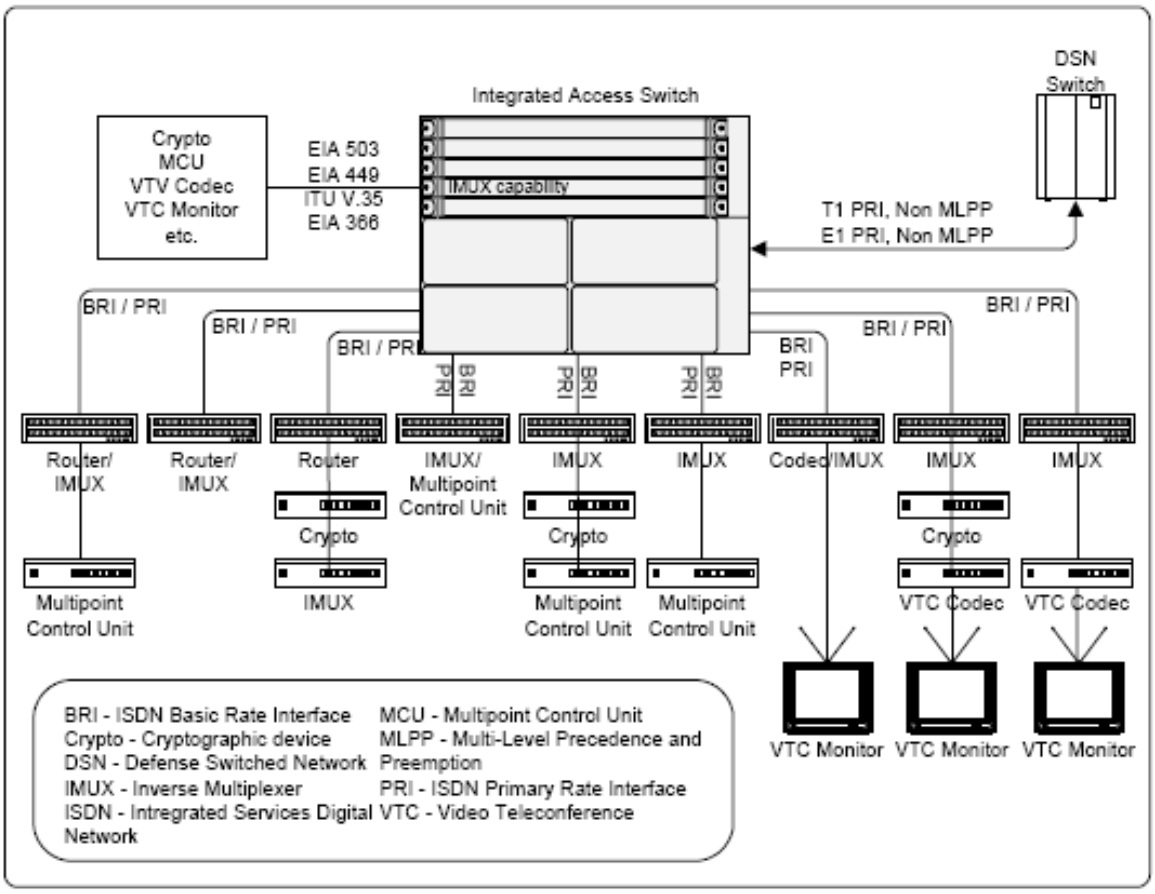

Figure 5.2.6-1. Typical Connections for an IAS

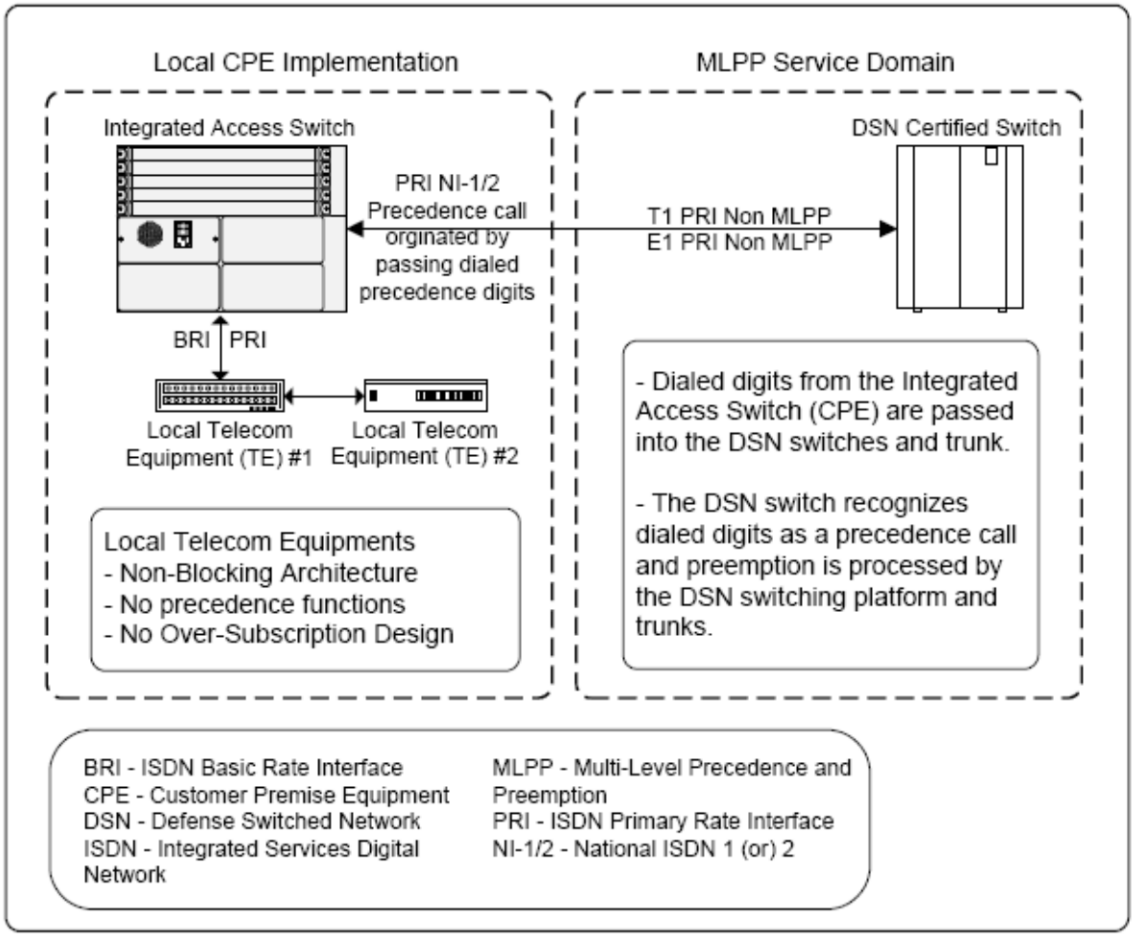

Figure 5.2.6-2. MLPP Implementation and the IAS

Figure 5.2.6-3, Applications for the IAS, shows the applications for the IAS.

All IASs are required to meet the requirements stated in Sections 5.2.6.2.1 through 5.2.6.2.7.

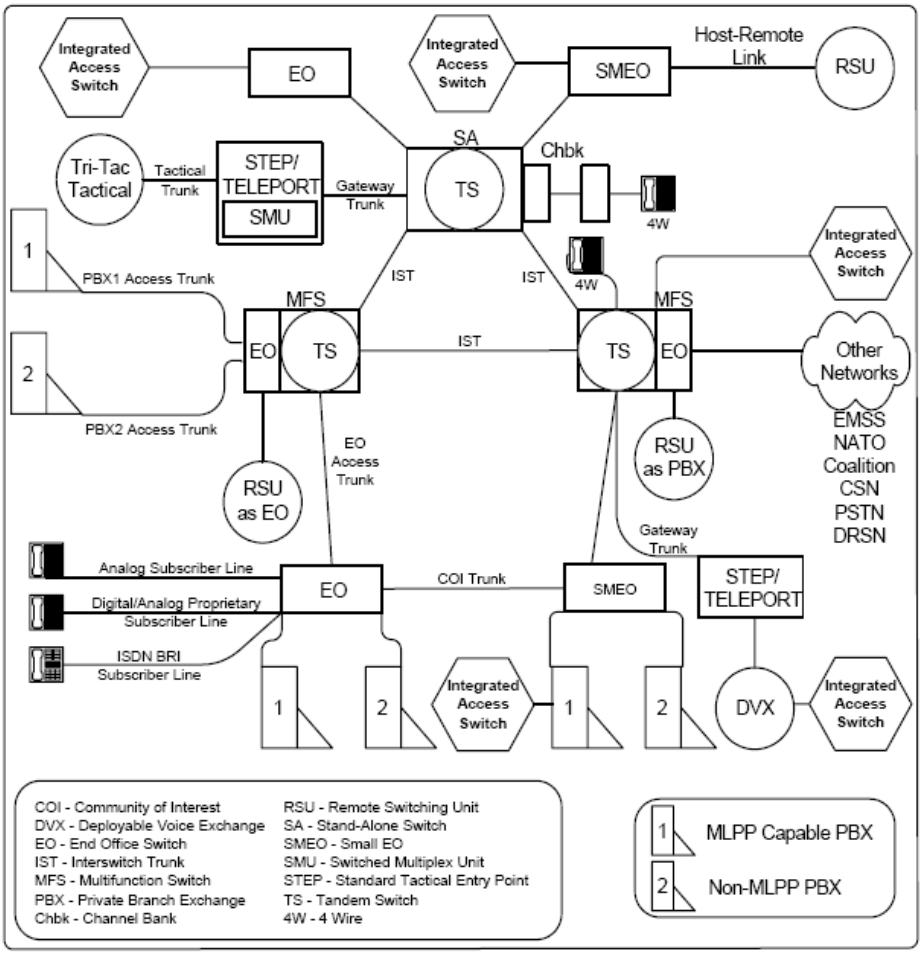

Figure 5.2.6-3. Applications for the IAS

5.2.6.2.1 Interfaces

The DSN interfaces:

[Required] T1 ISDN PRI NI 1/2

1. The IAS shall conform to UCR 2008, Section 5.2.1.3.4, ISDN Primary Access, and UCR 2008, Section 5.2.4.7, ISDN Digital Subscriber Signaling System No. 1 Signaling, inclusive and shall provide the ISDN PRI capabilities shown in UCR 2008, Table 5.2.9-5, PRI Features.

2. The IAS shall conform to Telcordia Technologies SR-2275, Table 14-4, which provides the specific requirements for features and capabilities listed in Table 5.2.6-1, T1 PRI Access, Call Control, and Signaling.

The IAS shall support a line timing mode in accordance with UCR 2008, Section 5.2.10.1, Timing Modes.

Table 5.2.6-1. T1 PRI Access, Call Control, and Signaling

FEATURE OR CAPABILITY	REQUIREMENT
PRI Layer 1	Required
PRI Layer 2 (Circuit)	Required
PRI Call Control and Signaling Basic Call Control for Circuit-Mode Calls Multiple DS1 Facilities Controlled by a Single D-Channel D-Channel Backup Access to Selected Primary Rate Services on a Per-Call Basis PRI Interworking with SS7	 Required Conditional Conditional Conditional Conditional
Uniform Cause Values and Location Indicators – Subset	Conditional
RESTART Procedures Support of Single Interface Initiated by the CPE Support of RESTART of All DS1s Controlled by a D-Channel Initiated by the SPCS Support of RESTART Collision Procedures	 Conditional Conditional Conditional
SWF-DS1	Required
PRI Packet-Mode Call Control	Conditional

[Conditional] E1 ISDN PRI

If provided, the IAS shall conform to UCR 2008, Section 5.2.1.3.4, ISDN Primary Access, and UCR 2008, Section 5.2.4.7, ISDN Digital Subscriber Signaling System No. 1 Signaling, inclusive.

The TE interfaces:

[Required] One of the following interfaces is required:

1. **[Conditional]** T1 ISDN PRI NI 1/2

    a. The IAS shall conform to UCR 2008, Section 5.2.1.3.4, ISDN Primary Access, and UCR 2008, Section 5.2.7, Tandem Switching, inclusive and provide the ISDN PRI capabilities shown in Table 5.2.6-2, T1 PRI Access, Call Control, and Signaling.

    b. The IAS shall conform to Telcordia Technologies SR-2275, Table 14-4, which provides the specific requirements for features and capabilities listed in Table 5.2.6-2.

Table 5.2.6-2. T1 PRI Access, Call Control, and Signaling

FEATURE OR CAPABILITY	REQUIREMENT
PRI Layer 1	Required
PRI Layer 2 (Circuit)	Required
PRI Call Control and Signaling Basic Call Control for Circuit-Mode Calls Multiple DS1 Facilities Controlled by a Single D-Channel D-Channel Backup Access to Selected Primary Rate Services on a Per-Call Basis PRI Interworking with SS7	 Required Conditional Conditional Conditional Conditional
Uniform Cause Values and Location Indicators - Subset	Conditional
RESTART Procedures Support of Single Interface Initiated by the CPE Support of RESTART of All DS1s Controlled by a D-Channel, Initiated by the SPCS Support of RESTART Collision Procedures	 Conditional Conditional Conditional
SWF-DS1	Required
PRI Packet-Mode Call Control	Conditional

2. **[Conditional]** E1 ISDN PRI NI 1/2

The IAS shall conform to UCR 2008, Section 5.2.4.7, ISDN Digital Subscriber Signaling System No. 1 Signaling, inclusive.

3. **[Conditional]** ISDN BRI NI 1/2

   a. The IAS shall conform to the requirements in UCR 2008, Section 5.2.1.3.3, National ISDN 1/2 Basic Access, and UCR 2008, Section 5.2.9, Integrated Services Digital Network, inclusive, with the exception that the IAS may include either the S/T or U interface, and provide the ISDN BRI capabilities shown in Table 5.2.6-3, BRI Access, Call Control, and Signaling.

   b. The IAS shall conform to Tables 14-1 through 14-3 of Telcordia Technologies SR-2275, which provides the specific requirements for features and capabilities listed in Table 5.2.6-3.

5.2.6.2.2 Security

[Required] The IAS shall conform to the requirements outlined in DoDI 8510.bb and the applicable DSN STIGs.

Table 5.2.6-3. BRI Access, Call Control, and Signaling

FEATURE OR CAPABILITY	REQUIREMENT
ISDN BRI Layer 1	Required
4:1 TDM Method for ISDN Basic Access	Conditional
ISDN BRI Layer 2	Required
BRI Circuit-Mode Call Control Basic Call Control	Required Required
Uniform Cause Values and Location Identifiers – Subset	Conditional
BRI Terminal Initialization	Required
Service Profile Identifier	Required
Parameter Downloading Parameter Downloading – Version 2 (Extensions for Virtual Key Service) Download Additional Data for Softkey Operations – Parameter Downloading – Version 2.1	 Conditional Conditional Conditional
Automatic SPID	Conditional
Default Services for Terminals	Conditional
BRI Interworking with SS7	Conditional
ISDN BRI Packet-Mode Call Control User Originated, On-Demand B-Channel Packet Conditional Notification	Conditional Conditional Conditional

5.2.6.2.3 Numbering Plan

[Required] The IAS shall provide the capability to integrate its numbering plan with the 10-digit format of the NANP and conform to the UCR 2008, Section 5.2.3.5.1, DSN Worldwide Numbering and Dialing Plan, inclusive, which defines the DSN WWNDP.

[Required] The IAS line number assignments shall be within existing geographic DSN WWNDP office codes and shall support the same format that the local PSTN/POTS numbers are assigned (NPA-NXX-XXXX).

[Required] The IAS numbering shall conform to ITU-T Recommendation E.164. It shall be able to send all digits defined in UCR 2008, Table 5.2.3-6, DSN User Dialing Format. The IAS shall be able to receive dialed digits and manipulate them, as necessary, to support the above requirement.

5.2.6.2.4 Provisioning

[Conditional] The IAS shall provide a software capability to ensure that the number of provisioned TE interface bearer channels do not exceed the number of provisioned DSN or commercial interface bearer channels. This is to reduce the possibility of a call destined for a TE to be blocked by the DSN or commercial interfaces not having available bearer channels for this call.

[Required] The IAS shall provide the capability to allocate a specific amount of bandwidth to each of the TE interfaces at the DS0 level. Calls originating from the TE interfaces shall be prevented from exceeding this bandwidth.

5.2.6.2.5 Reliability

[Required] The IAS equipment reliability and availability shall conform to Telcordia Technologies GR-512-CORE, Section 5, as specified for individual devices. The vendor shall provide a reliability model for the system, showing all calculations and showing how the overall availability will be met, if requested.

5.2.6.2.6 Loopback Capability

[Conditional] The IAS shall provide a loopback capability on each of the TE interfaces in accordance with ITU-T Recommendation V.54.

5.2.6.2.7 IMUX Capability

[Conditional] The IAS IMUX capability shall meet the ITU-T Recommendation H.244 requirements and shall conform to FTR 1080B-2002 when connected to TE equipment. Also, the IAS IMUX shall provide one or more of the following interfaces:

- EIA-366-A
- EIA-449-1
- TIA/EIA-530-A
- ITU-T Recommendation V.35

5.2.7 Softphones

This section provides requirements for a softphone application.

5.2.7.1 Softphone Interface

[Required] The softphone application shall support the following interface capabilities provided by the general-purpose computer hosting the softphone:

- Microphone and speaker or headphone, or any other audio input/output device
- Ethernet interface(s)
- Mouse (point and click) interaction

5.2.7.2 Softphone Alerting Signals and Tones

[Required] The softphone shall provide audible and visual alerting to the end user of an incoming call, even if the application is running in the background.

5.2.7.3 Softphone Reliability

[Conditional] The softphone application shall be exempt from reliability requirements specified in Section 5.3.2.6.1.7

5.2.7.4 Softphone Security

[Required] Softphone security and all Information Assurance requirements are provided in Section 5.4, Information Assurance Requirements.

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