

VTOA Desktop Tip Sheet - Required incremental subset of UNI Signalling 4.0 from UNI 3.1

(to be used in conjunction with af-vtoa-0083.000)

This document is for informational purposes.

“Voice and Telephony Over ATM to the Desktop” requires a UNI signalling 4.0. However, the subset of the UNI Signalling 4.0 (af-sig-0061.000) capabilities necessary for VTOA to the Desktop (not already supported by UNI 3.1) is a relatively small subset of the overall UNI Signalling 4.0 capabilities.

“Voice and Telephony Over ATM to the Desktop” is part of N-ISDN emulation and interworking. It requires the use of that subset of UNI signalling 4.0 capabilities. A voice call is encoded the same way it would be in N-ISDN, i.e., 64 kbit/s PCM encoded data (A-Law or μ -Law). The signalling capabilities were essentially ported over from Q.931 (which is the N-ISDN signalling access protocol).

This subset is part of ITU-T Recommendation Q.2931. UNI 3.1 is based on Q.2931, but it specifically excluded the N-ISDN emulation and interworking procedures of section 6/Q.2931 and Annex E/Q.2931. However, PNNI 1.0 (like UNI Signalling 4.0) supports the transport of the messages and information elements necessary for these procedures.

This tip sheet describes the signalling capabilities required over and above those of UNI 3.1, and compares them to UNI Signalling 4.0 and PNNI 1.0 signalling capabilities.

Table 1 summarizes which messages, information elements and codepoints are supported for various capabilities of VTOA to the Desktop by UNI Signalling 4.0, UNI 3.1 and PNNI 1.0. It also illustrates if the associated capabilities are mandatory or optional for VTOA to the Desktop. The subsequent sections describes Table 1 in more details, and includes references to the associated procedures.

Table 1 Messages and information elements support

Signalling message, information element or codepoint	Capability	UNI SIG 4.0	UNI 3.1	PNNI 1.0	VTOA desktop
NOTIFY/Notification indicator	Notification procedures	√	-	√	Note 1
PROGRESS/Progress indicator	Notification of interworking	√	-	√	M
AAL for voice in AAL parameters	AAL negotiation	√	-	√	O
Cause value #93	AAL negotiation	√	Note 2	√	M
ALERTING	Call/connection alerting	√	-	√	M
Narrowband bearer capability	N-ISDN service	√	-	√	M
Narrowband low layer compatibility	N-ISDN service	√	-	√	O
Narrowband high layer compatibility	N-ISDN service	√	-	√	O
Called party number	DDI, MSN	√	√	√	O
Called party subaddress	SUB	√	√	√	O
Calling party number	CLIP, CLIR, MSN	√	√	√	O
Calling party subaddress	CLIP	√	√	√	O
Connected number	COLP, COLR	√	-	√	O
Connected subaddress	COLP	√	-	√	O
User-user information	UUS	√	-	Note 4	O
AFI=x049 "Local ATM Format"	PNP Addressing	Note 3			O

Messages, information elements or codepoint are supported (√)

Messages, information elements or codepoint are not supported (-)

Mandatory capability (M)

Optional capability (O)

Note 1 - The Notification procedures are only necessary if adaptive timing recovery is used.

Note 2 - Cause values #78 and #93 have the same meaning in UNI 3.1

Note 3 - Not explicitly mentioned, but in accordance with the principles of the specifications.

Note 4 - See section 8.8 on how UUS can be supported in PNNI.

1 Notification procedures

The NOTIFY message and Notification indicator information element are not supported in UNI 3.1, but are supported in PNNI 1.0, UNI Signalling 4.0 and Q.2931. UNI 3.1 is based on Q.2931, but it specifically excludes the notification procedures. The NOTIFY message is described in 3.1.10/Q.2931 and 6.3.1.9/PNNI 1.0. The Notification indicator information element is described in 4.5.23/Q.2931 (which refers back to 8.2.8/Q.932) and

6.4.5.27/PNNI 1.0 (which refers back to Q.2931). The notification procedures are described in 5.9/Q.2931 and 6.5.10/PNNI 1.0 (which refers back to Q.2931).

The notification procedures are used in VTOA to the Desktop to signal adaptive timing recovery for the transmit clock (see section 2.5.3). A new codepoint specific to VTOA Desktop “adaptive timing recovery used for the transmit (TX) clock” is used. The procedures are of end-to-end significance and the B-ISDN simply transports the Notification indicator information element in a NOTIFY or other message. This message may also be useful when interworking with N-ISDN (e.g., in conjunction with narrowband supplementary services).

2 Notification of interworking procedures (Progress)

The PROGRESS message and Progress indicator information element are not supported in UNI 3.1, but are supported in PNNI 1.0, UNI Signalling 4.0 and Q.2931. UNI 3.1 is based on Q.2931, but it specifically excludes the notification of interworking procedures. The PROGRESS message is described in 3.2.5/Q.2931 and 6.3.2.3/PNNI 1.0. The Progress indicator information element is described in 4.6.5/Q.2931 (which refers back to 4.5.23/Q.931) and in 6.4.7.4 (which refers back to Q.2931). The notification of interworking procedures are described in 6.6/Q.2931 and 6.5.11/PNNI 1.0.

The notification of interworking procedures are used to indicate interworking with other networks (analogue, private, etc.) and normally only require transport of the Progress indicator information element in a PROGRESS or other message through the B-ISDN. In some cases, it requires stopping some timers.

3 AAL negotiation

Two AALs are supported for 64 kbit/s: "AAL for voice" which is a very simplified version of AAL1, and AAL5.

AAL negotiation procedures (2.5.4) are required. AAL negotiation procedures require the use of UNI Signalling 4.0 cause value #93, “AAL parameters cannot be supported”. UNI 3.1 has conflicting cause values assigned to “AAL parameters cannot be supported”: cause value #78 and cause value #93. To ensure compatibility, a terminal should treat reception of cause value #78 as cause value #93, and should generate cause value #93 instead of cause value #78.

4 Call/connection alerting

The ALERTING message is not supported in UNI 3.1, but is supported in PNNI 1.0, UNI Signalling 4.0 and Q.2931. UNI 3.1 is based on Q.2931, but it specifically excludes the ALERTING message. The ALERTING message is described in 3.2.1/Q.2931 and 6.3.2.1/PNNI 1.0.

The ALERTING message is sent by a called terminal to the calling terminal to indicate that the called user is being alerted (i.e., that the phone is ringing). A PARTY ALERTING is also defined in 8.1.2.3/Q.2971 and 6.3.4.3/PNNI 1.0 for point-to-multipoint calls, but it is outside the scope of this specification. The ALERTING message is of end-to-end significance and the B-ISDN simply transport the message. Section 6.7.1.2/Q.2931 and section 6.5.2.5/PNNI 1.0 describes call/connection alerting procedures.

Call/connection alerting also implies two call states for each side of the UNI for the state machine:

- Call delivered (U4): This state exists for an outgoing call when the calling user has received an indication that that remote user alerting has been initiated.
- Call received (U7): This state exists for an incoming call when the user has received a call establishment request but has not yet responded.

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- Call delivered (N4): This state exists for an outgoing call when the network has indicated that the remote user alerting has been initiated.

- Call received (N7): This state exists for an incoming call when the network has received an indication that the user is alerting but has not yet received an answer.

On the PNNI, the two call states are:

- Alerting delivered (NN4): This state exists when a succeeding side has sent an ALERTING message to the preceding side.

- Alerting received (NN7): This state exists when a preceding side has received an ALERTING message from the succeeding side of the PNNI.

The support of ALERTING message and the call/connection alerting procedures are mandatory.

5 Narrowband bearer capability information element

The Narrowband bearer capability (N-BC) information element is not supported in UNI 3.1, but is supported in PNNI 1.0, UNI Signalling 4.0 and Q.2931. UNI 3.1 is based on Q.2931, but it specifically excludes the N-BC information element. The N-BC is described in 4.6.2/Q.2931 (which refers back to 4.5.5/Q.931) and 6.4.7.1/PNNI 1.0 (which refers back to Q.2931).

The N-BC information element is essential for the support of any N-ISDN service, including VTOA to the Desktop. It is the information element used to signal that a N-ISDN service (e.g., 64 kbit/s PCM-encoded A-Law or μ -Law speech) is requested.

6 Narrowband high layer compatibility information element

The Narrowband high layer compatibility (N-HLC) information element is not supported in UNI 3.1, but is supported in PNNI 1.0, UNI Signalling 4.0 and Q.2931. UNI 3.1 is based on Q.2931, but it specifically excludes the N-HLC information element. The N-HLC is described in 4.6.3/Q.2931 (which refers back to 4.5.17/Q.931) and 6.4.7.2/PNNI 1.0 (which refers back to Q.2931).

The N-HLC information element is not essential for the support of any N-ISDN service, including VTOA to the Desktop. It is of end-to-end significance and transported transparently by the B-ISDN. "Voice and Telephony Over ATM to the Desktop" does not make use of the N-HLC information element, but it could be used in the N-ISDN.

7 Narrowband low layer compatibility information element

The Narrowband low layer compatibility (N-LLC) information element is not supported in UNI 3.1, but is supported in PNNI 1.0, UNI Signalling 4.0 and Q.2931. UNI 3.1 is based on Q.2931, but it specifically excludes the N-LLC information element. The N-LLC is described in 4.6.4/Q.2931 (which refers back to 4.5.19/Q.931) and 6.4.7.3/PNNI 1.0 (which refers back to Q.2931).

The N-LLC information element is not essential for the support of N-ISDN services. It is of end-to-end significance and transported transparently by the B-ISDN. "Voice and Telephony Over ATM to the Desktop" does not make use of the N-LLC information element, but it could be used in the N-ISDN.

8 UNI Signalling 4.0 supplementary services

Although only UNI Signalling 4.0 explicitly supports these supplementary services, most of them do not have any extra signalling requirements over what is in UNI 3.1 or PNNI 1.0 because they support the required messages and information elements. All these services are optional.

8.1 Direct Dialling In (DDI)

DDI uses the called address in the Called party number information element to route the call. Since delivery of the Called party number information element in the SETUP message is mandatory in both directions in UNI 3.1, UNI Signalling 4.0 and PNNI 1.0, there is no additional signalling requirements in to support DDI.

8.2 Multiple Subscriber Number (MSN)

MSN allows the use of more than one address for one endpoint using the called address in the Called party number information element to distinguish them. Since delivery of the called party number in the SETUP message is mandatory in both directions in UNI Signalling 4.0 and PNNI 1.0, there is no additional signalling requirements in to support MSN.

8.3 Calling Line Identification Presentation (CLIP)

Since the Calling party number and Calling party subaddress information elements are supported in UNI 3.1, there is no additional signalling requirements to support CLIP beyond including the Calling party number and possibly the Calling party subaddress information elements in the SETUP message.

8.4 Calling Line Identification Restriction (CLIR)

To restrict presentation of the calling party number at the called party, the calling party shall set the “presentation indicator” in the Calling party number information element to “presentation restricted”. To allow presentation of the calling party number at the called party, the calling party shall set the “presentation indicator” in the Calling party number information element to “presentation allowed”.

8.5 Connected Line Identification Presentation (COLP)

COLP requires the use of the Connected number and possibly the Connected subaddress information elements as defined in 5.8/Q.2951. UNI Signalling 4.0 and PNNI 1.0 support the Connected number and Connected subaddress information elements, but not UNI 3.1.

8.6 Connected Line Identification Restriction (COLR)

COLR requires the use of the Connected number information element as defined in 5.8/Q.2951. UNI Signalling 4.0 and PNNI 1.0 support the Connected number information element, but not UNI 3.1.

To restrict presentation of the connected number at the calling party, the connected party shall set the “presentation indicator” in the Connected party number information element to “presentation restricted”. To allow presentation of the connected number at the calling party, the connected party shall set the “presentation indicator” in the Connected number information element to “presentation allowed”.

8.7 Subaddressing (SUB)

SUB uses the called subaddress in the Called party subaddress information element to expand the addressing capabilities beyond the normal capabilities provided by the B-ISDN numbering plan. Since the Called party subaddress information element is supported in UNI 3.1, there is no additional signalling requirements to support SUB beyond including the Called party subaddress information element in the SETUP message.

8.8 User-to-user signalling (UUS) Service 1

UUS requires the use of the User-user information information element as described in Q.2957.1. UUS is not supported in either UNI 3.1 or PNNI 1.0, but is supported in UNI Signalling 4.0. However, UUS could be supported at the PNNI with the use of the pass along indicator.

9 Addressing

Section 6 provides additional guidance on addressing within a Private Numbering Plan. While this addressing scheme is implicitly supported by PNNI 1.0/UNI 3.1, 4.0, there is no guidance on how to support it. Addressing in a Private numbering plan can make use of a special AFI=0x49 for "Local ATM Format". The use of this AFI is crucial for migrating classical enterprise networks numbering plan (e.g., PBX-type telephony private numbering plan) to ATM.