# The ATM Forum
# Technical Committee

## Addendum to BISDN Inter Carrier Interface (B-ICI) Specification, v2.0 (B-ICI Specification, v2.1)

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## ADD.1 BISUP Signaling Procedures for Variable Bit Rate Connections

The ATM Traffic Descriptor IE in the SETUP message from the user indicates the required traffic parameters for the requested call. This IE can indicate only the peak cell rates for the connection or peak cell rates, sustainable cell rates, maximum burst sizes and the best effort indicator for the connection. The BISUP ATM Cell Rate parameter can carry only peak cell rate values and the Additional ATM Cell Rate parameter can carry only sustainable cell rate values, maximum burst size values and the best effort indicator. Therefore, for a given connection, only the ATM Cell Rate parameter or both the ATM Cell Rate parameter and the Additional ATM Cell Rate parameter will be included in the IAM depending on the ATM traffic parameters requested by the user. Note that the mandatory ATM Cell Rate parameter will always be included. **(R) 7-31** in the B-ICI Specification, V 2.0, implies that only the ATM Cell Rate parameter needs to be included in the IAM even when the peak cell rates, sustainable cell rates and maximum burst sizes for the connection are requested by the user. *Therefore, this requirement needs to be modified and two new requirements need to be added.*

***The underlined text is added to the descriptive paragraph above (R) 7-31 as shown.***

The ATM Traffic Descriptor IE in the SETUP message from the user indicates the required traffic parameters for the requested call. Traffic parameters include peak forward and backward cell rates with Cell Loss Priority (CLP) = 0 and 0+1, sustainable cell rate, etc. Requirements in the current version of this document support symmetric and asymmetric switched connections characterized by forward and backward peak cell rate, sustainable cell rate, and maximum burst size with CLP = 0 and 0+1. Symmetric connections are characterized by identical sets of traffic parameters for the forward and backward directions. Asymmetric connections are characterized by two sets of traffic parameters, one each for the forward and backward directions. <u>The ATM Cell Rate parameter can carry only peak cell rate values and the Additional ATM Cell Rate parameter can carry only sustainable cell rate values, maximum burst size values and best effort indicator. Therefore, for a given connection, only the ATM Cell Rate parameter or both the ATM Cell Rate parameter and the Additional ATM Cell Rate parameter will be included in the IAM depending on the ATM traffic parameters requested by the user.</u>

***In the B-ICI Specification, V 2.0, (R) 7-31 is replaced with the following new requirement.***

**(R) 7-31** The originating BSS shall always include the ATM Cell Rate parameter in the IAM. The originating BSS shall include both the ATM Cell Rate parameter and the Additional ATM Cell Rate parameter in the IAM if the ATM Traffic Descriptor IE in the SETUP message from the user indicates peak cell rates, sustainable cell rates and maximum burst sizes or best effort for the connection. If the ATM Traffic Descriptor IE in the SETUP message from the user indicates only the peak cell rates for the connection, the Additional ATM Cell Rate parameter is not needed and hence not included in the IAM. The coding of these parameters shall be based on the coding of the ATM Traffic Descriptor IE in the SETUP message.

***The following two new requirements (R) 7-31a and (R) 7-31b are added after (R) 7-31.***

**(R) 7-31a** The originating BSS shall include the ATM Cell Rate parameter in the IAM. The coding of this parameter shall be based on the coding of the ATM Traffic Descriptor IE in the SETUP message from the user. The allowed codings of the cell rate identifier subfields shall be forward and backward peak cell rate for CLP = 0 and 0+1. The cell rate subfields shall be coded according to the peak cell rates requested by the user. Symmetric and asymmetric peak cell rate connections for CLP = 0 and 0+1 shall be supported.

**(R) 7-31b** In addition to the ATM Cell Rate parameter that is always included, the originating BSS shall also include the Additional ATM Cell Rate parameter in the IAM if the ATM Traffic Descriptor IE in the SETUP message from the user indicates, in addition to the peak cell rates, sustainable cell rates and maximum burst sizes or best effort for the connection. If included, the coding of Additional ATM Cell Rate parameter shall be based on the coding of the ATM Traffic Descriptor IE. The allowed codings of the cell rate identifier subfields (in the Additional ATM Cell Rate parameter) are forward and backward sustainable cell rate for CLP = 0 and 0+1, forward and backward maximum burst size for CLP = 0 and 0+1 and best effort indicator. The sustainable cell rate subfields (in cells/s) and the maximum burst size subfields (in cells) shall be coded according to the corresponding subfields in the ATM Traffic Descriptor IE. Symmetric and asymmetric connections characterized by peak cell rates, sustainable cell rates and maximum burst size for CLP = 0 and 0+1 shall be supported. In case best effort is requested by the user, the Additional ATM Cell Rate parameter shall carry the best effort indicator.

## References

1. ITU-T Recommendation Q.2723.1, BISDN, Broadband ISDN User Part - Additional Traffic Parameters for Sustainable Cell Rate (SCR) and Quality Of Service (QOS).
2. ANSI-T1.658, Broadband ISDN User Part (B-ISUP) - Additional Traffic Parameters for Sustainable Cell Rate (SCR) and Quality of Service (QOS).

## ADD.2 Network Call Correlation Identifier

This section introduces BISUP signaling requirements and usage measurement requirements for Network Call Correlation Identifier (NCCI) parameter. This identifier can be used for reliable correlation of usage measurement data collected at different BSSs in the call path. The correlation mechanism offered by this procedure can be used for point-to-point and point-to-multipoint SVCs. The correlation would be done by an external system. The ITU-T Recommendation Q.2726.3 on this subject has been approved. Additions needed to the B-ICI Specification, V 2.0, follow.

The NCCI is used to identify a call end-to-end so that usage measurements generated for it at different BSSs can be correlated by an external system. Usage measurements for ATM SVCs are described in Section 12.4 of the B-ICI Specification, V 2.0. The possible locations at which usage measurements can be generated for a point-to-point SVC are illustrated in Figures 12.9 and 12.10. The possible locations at which usage measurements can be generated for a point-to-multipoint SVC are illustrated in Figures 12.12 and 12.13.

When usage measurements are generated at multiple BSSs within the same network (e.g., at the originating BSS and intermediate BSS in the originating carrier network) for a point-to-point SVC, it is essential for the integrity of the billing process to accurately and reliably correlate the usage measurements. When usage measurements are generated by multiple networks (e.g., by the originating, transit, and terminating carrier networks), it would be useful to correlate the usage measurements to support end-user billing. The NCCI provides a way for an external system (such as a network management system or billing system) to perform this correlation.

### 7.8.5.1 Forward Address Signaling

#### 7.8.5.1.1 Actions Required at the Originating BSS

(d) IAM - Sent by the Assigning BSS

***After (R) 7-60, the following is added:***

The NCCI is a unique identifier for the call that is generated by the originating BSS when a SETUP message is received for the call. This parameter is included in the IAM. Depending on the usage measurement and billing process for ATM SVCs, the NCCI may not be needed for all SVCs. Therefore, the originating BSS should be settable to generate or not generate the NCCI. The NCCI might be desired for certain type of calls based on characteristics such as: user plane connection configuration, traffic type (e.g., Constant Bit Rate or Variable Bit Rate), QOS class.

This document does not specify the algorithm used by the originating BSS to generate the NCCI. Although this algorithm is implementation-dependent, the format of the NCCI is designed to make it globally unique.

Aspects of the NCCI that apply specifically to point-to-multipoint calls and to the intermediate BSS are discussed in the appropriate sections of this document.

**(R) 7-60a** The originating BSS shall have the capability to be set to always generate or never generate the NCCI in the IAM.

**(R) 7-60b** The NCCI consists of call identifier, point code and Network Identity (NI) subfields.

· The algorithm used to allocate the 4-octet call identifier to the call is implementation dependent. However, every call shall be assigned a unique identifier that is also unique over a sufficiently long time period so that an external system can reliably and accurately correlate the usage measurements. This time period is on the order of several days to several weeks. In other words, the BSS shall sequence through a broad range of identifier values before re-using a value. The BSS, for instance, can not immediately re-use a value for another call.

· The 3-octet point code subfield shall contain the point code of the BSS generating the NCCI.

· The 2-octet NI subfield consists of four BCD digits. The first digit is coded 0. The telephony country code follows in the second to fourth NI digits. The most significant country code digit is in the second NI digit. For example, the NI digits will be coded as “0100” for USA (country code 1), “0910” for India (country code 91) and “0358” for Finland (country code 358).

The BSS shall store the NCCI for the duration of the call and shall release it when the call is released.

### 7.8.5.1.3 Actions Required at an Intermediate BSS - Transit Carrier

***The following is added after (R) 7-86:***

Procedures for the NCCI are provided in Section 7.8.5.1.1d. As discussed in that section, the NCCI is typically generated by the originating BSS and carried in the IAM downstream without modification. For inter-carrier calls, however, it is possible that different carrier networks will have different needs for usage measurement correlation. For example, if the originating carrier network does not need the NCCI for a specific call, the originating BSS (in the originating carrier network) may not generate it. If the transit carrier network requires the NCCI for the call (because the usage measurement and billing policies are different), then an intermediate BSS (in the transit carrier network) would need to generate it.

Consequently, the procedures defined for the NCCI generation in Section 7.8.5.1.1d also apply to the intermediate BSS in the transit carrier network. However, these procedures apply only if the received IAM for the call ***does not include*** the NCCI and the transit carrier needs to generate the NCCI for its own use or for the use of a succeeding carrier. If the IAM received from the preceding carrier network includes the NCCI, then the intermediate BSS in the carrier network does not generate a new NCCI, but instead uses the received NCCI for call correlation if it so chooses. If the received IAM for the call includes the NCCI, the BSS, whether it makes use of the NCCI for call correlation or not, must pass on the received NCCI without modification to the succeeding BSS.

### 7.8.5.1.4 Actions Required at an Intermediate BSS - Terminating Network

### 7.8.5.1.4.1 Incoming Side of the BSS

### 7.8.5.1.4.2 Outgoing Side of the BSS

(b) Parameters in the IAM Sent by the Assigning BSS

***The following is added after (R) 7-93:***

Procedures for the NCCI are provided in Section 7.8.5.1.1d. As discussed in that section, the NCCI is typically generated by the originating BSS and carried in the IAM downstream without modification. For inter-carrier calls, however, it is possible that different carrier networks will have different needs for usage measurement correlation. For example, if the originating and transit carrier networks do not need the NCCI for a specific call, the originating BSS (in the originating carrier network) may not generate it. If the terminating carrier network requires the NCCI for the call (because the usage measurement and billing policies are different), then the intermediate BSS (in the terminating carrier network) would need to generate it.

Consequently, the procedures defined for the NCCI generation in Section 7.8.5.1.1(d) also apply to the intermediate BSS in the terminating carrier network. However, these procedures apply only if the received IAM for the call ***does not include*** the NCCI and the terminating carrier needs to generate the NCCI for its own use. If the IAM received from the preceding carrier network includes the NCCI, then the intermediate BSS in the terminating carrier network does not generate a new NCCI, but instead uses the received NCCI for call correlation if it so chooses. If the received IAM for the call includes the NCCI, the BSS, whether it makes use of the NCCI for call correlation or not, must pass on the received NCCI without modification to the succeeding BSS.

## 7.11 Point-to-Multipoint Call and Connection Control

### 7.11.1 Call and Connection Control Functions

### 7.11.2 Successful Call and Connection Set-Up

### 7.11.2.1 Forward Address Signaling - Set-up of the First Leaf Party

### 7.11.2.1.1 Actions Required at the Originating BSS

(d) IAM Sent by the Assigning BSS

***The following is added after (R) 7-224:***

Procedures for the NCCI generation for point-to-point calls are provided in Section 7.8.5.1.1(d). As discussed in that section, the need for the NCCI may depend on the user plane connection configuration of the SVC. It is expected that NCCI will always be needed for point-to-multipoint calls.

The NCCI is needed for a point-to-multipoint call because the usage measurements for such a call may be generated by multiple BSSs involved in the call. Examples of the potential usage measurement locations for a point-to-multipoint call are the BSSs serving the root and various leaf parties. NCCI would enable the billing system to manage these usage

measurements and construct a complete view of the point-to-multipoint call. For a point-to-multipoint call, the IAM for additional leaf parties will include the same NCCI as for the first leaf party.

**(R) 7-224a** The originating BSS shall include the NCCI in the IAM for a point-to-multipoint call. The NCCI shall be stored at the originating BSS or associated data base so that an identical copy of this parameter can be sent in the subsequent IAMs for the addition of leaf parties.

## 12. Usage Measurement

### 12.4 SVC Service-Independent Usage Information

#### 12.4.1 Originating Carrier Network

***The following is added after (R) 12-39:***

**(R) 12-39a** For Inter Carrier SVCs, the Originating Carrier Network shall be capable of recording the Network Call Correlation Identifier (NCCI) parameter (when present) from the IAM associated with the SVC.

In addition, the NCCI should be illustrated in Figure 12.9 “Originating Carrier Network Usage Information”. The box labeled "Available at both ATM Switches" should be updated to include the following notation: NCCI (when present).

#### 12.4.2 Terminating Carrier Network

***The following is added after (R) 12-52:***

**(R) 12-52a** For Inter Carrier SVCs, the Terminating Carrier Network shall be capable of recording the Network Call Correlation Identifier (NCCI) parameter (when present) from the IAM associated with the SVC.

In addition, the NCCI is illustrated in Figure 12.10 “Terminating Carrier Network Usage Information”. The box labeled "Available at both ATM Switches" is updated to include the following notation: NCCI (when present).

## Reference

ITU-T Recommendation Q.2726.3, BISDN, Broadband ISDN User Part - Network Call Correlation Identifier.

## ADD.3 Support for DCC and ICD AESA Formats

### *Section 7, paragraph 3 is modified to read as follows:*

As currently specified in this document, procedures for the ATM Forum ATM End System Addresses (AESAs) based on the Data Country Code (DCC) and International Code Designator (ICD) formats are found in Annex A. These procedures only pertain to carriers who optionally wish to allow call setup based on DCC and ICD AESA formats. These B-ICI procedures for DCC and ICD AESAs conform to ANSI BISUP standards in order to fully support UNI Specification, V 3.1 addressees. The ITU-T BISUP AESA Recommendation, Q.2726.1 only supports E.164 AESA. The format of the AESA is based on ISO NSAP encoding according to ITU X.213 (ISO/IEC 8348) as described in the ATM Forum UNI Signaling Specification, V 3.1, Section 5.1.3 (or, UNI Signaling Specification, V 4.0, Section 3). The guidelines given in UNI Signaling Specification, V 3.1, Annex A (or, UNI Signaling Specification, V 4.0, Annex 1) apply.

# Annex - A: Procedures to Support ICD and DCC AESAs

## A1. Examples of the Use of ICD and DCC Addresses at a B-ICI

This section presents some examples of how IAM messages would be constructed when the UNI SETUP message contains an ICD or DCC AESA in the Called and Calling Party Number IEs. B-ICI Specification, Version 2.0 without this Annex A covers the cases of using E.164 native addresses or E.164 AESAs.

## A2. E.164 CdPN Required at the B-ICI

In the example shown in Figure 1, the originating carrier performs a translation from the DCC or ICD format AESA to an E.164 address. The call is delivered over the B-ICI. The terminating carrier in this example receives an IAM with both an E.164 address in the CdPN parameter and a DCC or ICD AESA in the AESA for CdP parameter. The carrier may use one or both of these parameters to determine the UNI to which to deliver the call.

At the terminating UNI, the original Called Party Number in the SETUP message, which is being carried in the AESA for Called Party parameter, is used to populate the Called Party Number IE in the SETUP.

**Note:** *The AESA for CgP and AESA for CdP parameters may contain DCC, ICD and E.164 format numbers. The call flow in Figure 1 only depicts the DCC and ICD formats.*

In this example the CgPN IE contents, if present, are mapped into the AESA for CgP parameter in the IAM by the originating carrier and no CgPN parameter is included. The originating carrier may use a default CgPN to populate a CgPN parameter, but this was not done in the example.

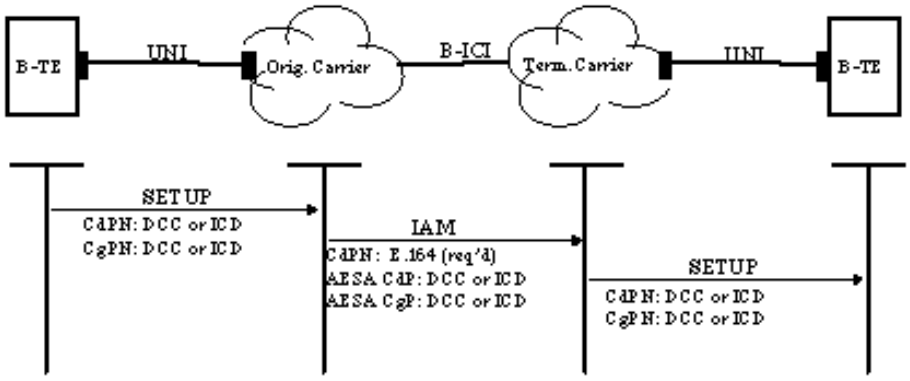


**Figure 1 Coding of IAM across B-ICI: Originating Carrier Generates an E.164 CdPN**

## A3. E.164 CdPN Not Required at the B-ICI

### (a) Without Called Party Number Translation

In the scenario shown in Figure 2, the originating carrier does not translate DCC and ICD format numbers to produce an E.164 number for the Called Party Number parameter, but rather codes the Called Party Number parameter to have no address digits and copies the 20 octet AESA into the AESA for Called Party parameter. In this example, the originating carrier delivers the call to the B-ICI of the terminating carrier, which also uses procedures capable of call setup using DCC or ICD AESAs.

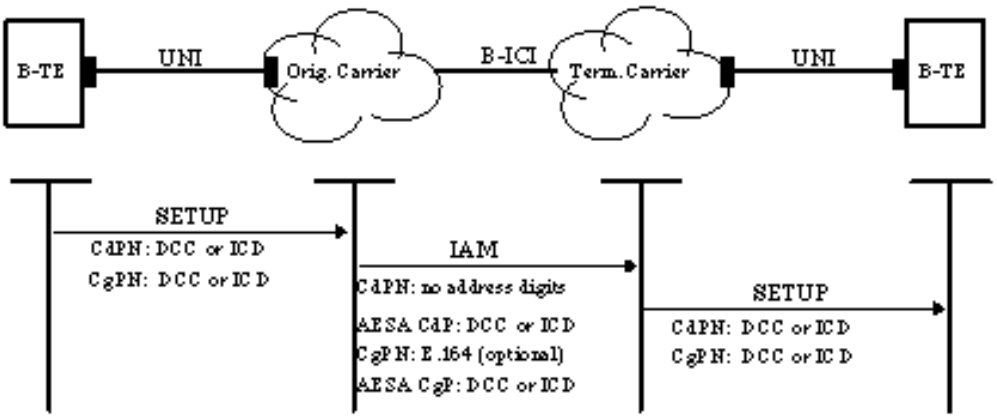


**Figure 2 Coding of IAM across B-ICI: Originating Carrier Generates a CdPN with no Address Digits**

Once the call is received at the terminating carrier's BSS, the AESA for Called Party (among other parameters, e.g., QoS) is used to deliver the call to the terminating customer's UNI. The Called Party Number parameter is not used since it contains no address digits.

At the terminating UNI, the original Called Party Number in the SETUP message, which is being carried in the AESA for Called Party parameter, is used to populate the Called Party Number IE in the SETUP.

The Calling Party Number parameter may be populated by the originating carrier using a default CgPN. If a Calling Party Number IE was included in the originating SETUP message, that number is restored in the terminating SETUP message at the terminating UNI by moving the AESA for CgP into the CgPN IE.

### (b) Originating Carrier Uses and Supports TNS

In the example in Figure 3 and in the absence of an E.164 address, the call normally fails, however, with a Transit Network Selection IE in the call SETUP, a call could be completed as described here.

As required in B-ICI version 2.0, a call SETUP with a ICD or DCC AESA as the Called Party Number and with a TNS IE will be mapped into an IAM containing the AESA in the AESA for Called Party and a Called Party Number with no address digits in the CdPN parameter. The call must be delivered to the carrier specified by the TNS. Note that the TNS is removed by the Originating Carrier before the call is progressed across the B-ICI.

The Transit Carrier receives the IAM and can perform any one of three actions, depending on the Transit Carrier's capabilities:

1. The Transit Carrier will clear the call.
2. The Transit Carrier uses the AESA for Called Party parameter to deliver the call to a succeeding network.
3. The Transit Carrier translates the AESA for Called Party parameter and uses the result to deliver the call to a succeeding network.

Figure 3 depicts an example in which the transit carrier and the terminating carrier are the same, i.e., the destination UNI is on the transit/terminating network.

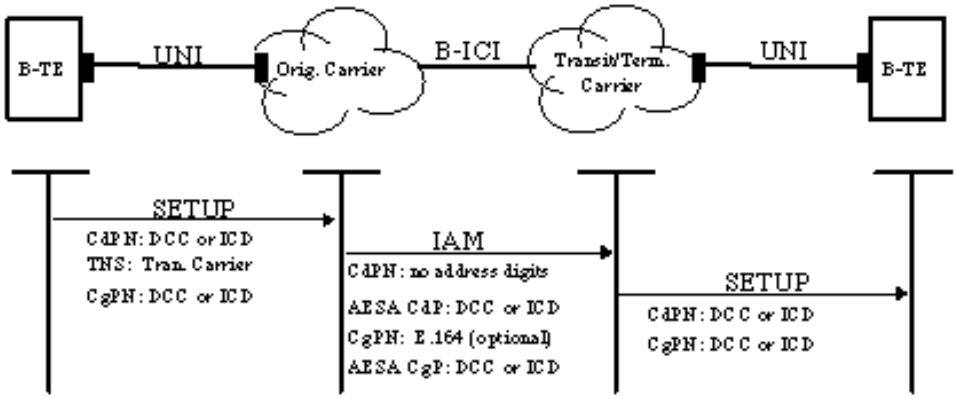


**Figure 3 Coding of IAM across B-ICI: Originating Carrier uses TNS and Generates a CdPN with no Address Digits**

## A4. Repopulating the CdPN

When a network receives a CdPN and an AESA for CdP in the IAM message, it may repopulate the CdPN by translation of AESA for CdP or by setting the CdPN to no address digits.

## A5. Requirements

These requirements apply only when a carrier wishes to implement the optional capability of allowing call setup based on ICD or DCC AESAs.

**(R) 7-37a** When an originating switch receives a ICD or DCC AESA in the Called Party Number IE of the Setup message, it shall copy the AESA into the AESA for Called Party parameter of the IAM and either: (a) generate an E.164 address and place it in the Called Party Number parameter for the IAM message, (b) generate a Called Party Number parameter with no address digits for the IAM message.

The incoming IAM at an intermediate switch may contain an AESA for Called Party parameter (in addition to a Called Party Number parameter). The Called Party Number parameter may contain an E.164 address or an address with no digits.

**(R) 7-41a** In (R) 7-41, the first sentence of the section titled "Octets 3-n:" applies only to E.164 addresses and E.164 AESAs. When an originating switch receives an ICD or DCC AESA in the Calling Party Number IE, if it populates the Calling Party Number parameter in the outgoing IAM, it shall set the screening indicator to "network provided."

**(R) 7-42** If the received Calling Party Number IE in the SETUP message contains an AESA (as indicated by the code "0010" in the Addressing/Numbering Plan Identification subfield), the AESA for Calling Party parameter will be included in the IAM provided its inclusion is allowed by subscription or prior arrangement. The entire AESA (20 octets) shall be carried in the AESA for Calling Party parameter. For E.164 AESAs, the inclusion of the AESA for Calling Party parameter in the IAM is in addition to the inclusion of the Calling Party Number parameter.

**(R) 7-73** The intermediate BSS shall include in the IAM the ATM Cell Rate, Broadband Bearer Capability, Called Party Number, AESA for Called Party if received, and Calling Party's category parameters. This signaling information will be identical (with the possible exception of the Called Party Number which may have been repopulated) with that in the IAM received from the preceding BSS.

**(R) 7-73a** If an intermediate switch receives an IAM with an AESA for Called Party parameter (containing DCC or ICD AESA), it may generate an E.164 number for the Called Party Number parameter of the outgoing IAM or utilize the incoming Called Party Number.

**(R) 7-93** The intermediate BSS shall include in the outgoing IAM the ATM Cell Rate, BBC, Called Party Number, AESA for Called Party if received, and Calling Party's Category parameters as in the received IAM (with the possible exception of the Called Party Number which may have been repopulated).

**(R) 7-93a** If an intermediate switch receives an IAM with an AESA for Called Party parameter (containing DCC or ICD AESA), it may generate an E.164 number for the Called Party Number parameter of the outgoing IAM or utilize the incoming Called Party Number.

The incoming IAM at a terminating switch may contain an AESA for Called Party parameter (in addition to a Called Party Number parameter). The Called Party Number parameter may contain an E.164 address or no address digits.

**(R) 7-111a** If a terminating switch receives an IAM with an AESA for Called Party parameter (containing DCC or ICD AESA), it may generate an E.164 number to identify the destination UNI.