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# ITU-T

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OF ITU

# E.191

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SERIES E: OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

Operation, numbering, routing and mobile services – International operation – Tones in national signalling systems

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## B-ISDN addressing

ITU-T Recommendation E.191

(Previously CCITT Recommendation)

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**ITU-T RECOMMENDATION E.191**

# B-ISDN ADDRESSING


## Summary

This Recommendation provides guidance, principles and requirements for addressing reference points located at subscribers' premises, servers allowing communications between terminals, applications and persons in B-ISDN networks.

This revision of E.191 was required in order to reflect the fact that B-ISDN addressing has also incorporated the use of non-E.164 ATM End System Addresses (AESAs) to be recognized in ATM Service Providers (ASP) networks.

This Recommendation proposes that ASPs use the ITU-IND AESA as the preferred method of B-ISDN addressing. Native E.164 and E.164 AESAs will continue to be supported. It is also recognized that other AESA formats are assigned and in use by ASPs.



## Source

ITU-T Recommendation E.191 was revised by ITU-T Study Group 2 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 13 March 2000.

## FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

## NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

## INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

## CONTENTS

**Recommendation E.191**

## B-ISDN ADDRESSING

*(revised in 2000)*

## 1 Scope

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This revision of E.191 was required in order to reflect the fact that B-ISDN addressing has also incorporated the use of non-E.164 ATM End System Addresses (AESAs) to be recognized in ATM Service Providers (ASP) networks.

This Recommendation proposes that ASPs use the ITU-IND AESA as the preferred method of B-ISDN addressing. Native E.164 and E.164 AESAs will continue to be supported. It is also recognized that other AESA formats are assigned and in use by ASPs.

## 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.


– ITU-T Recommendation E.164 (1997), *The international public telecommunications numbering plan*.

– ITU-T Recommendation E.166/X.122 (1998), *Numbering plan interworking for the E.164 and X.121 numbering plans*.

– ITU-T Recommendation Q.2931 (1995), *Digital Subscriber Signalling System No. 2 – User-Network Interface (UNI) layer 3 specification for basic call/connection control*.

– ITU-T Recommendation X.121 (1996), *International numbering plan for public data networks*.

– ITU-T Recommendation X.213 (1995) | ISO/IEC 8348:1996, *Information technology – Open Systems Interconnection – Network service definition*.


### 2.1 Other Sources


– AF-RA-0106.000 (1999), *ATM Forum Addressing: Reference Guide*.

– ISO/IEC 6523:1998, *Information technology – Structure for the identification of organizations and organization parts*.

## 3 Terms and definitions

This Recommendation defines the following terms:

**3.1 address**: An address is a string or combination of digits and symbols which identifies the specific termination points of a connection and is used for routing.

**3.2 subaddress**: The subaddress is an addressing element that provides a means to convey transparently additional address information through the ASP network.

**3.3 name**: A name is a combination of characters[1] and is used to identify end users.

**3.4 end user**: An end user is a logical concept which may refer to a person, a persona (e.g. work, home, etc.), a piece of equipment (e.g. NTE, phone, etc.), an interface, a service (e.g. Freephone), an application (e.g. Video-on-Demand), or a location.

**3.5 number**: A number is a string of decimal digits.

**3.6 native E.164**: The term "native E.164" is used to describe an E.164 number as opposed to an E.164 AESA. Throughout this Recommendation it will be denoted as E.164N.

**3.7 ATM service provider (ASP)**: Provides public correspondence services between end users, private networks or other ATM Service Providers, using an ATM network.

## 4 Abbreviations

This Recommendation uses the following abbreviations:

| | |
|---|---|
| AESA | ATM End System Address |
| AFI | Authority and Format Identifier |
| ANSI | American National Standards Institute |
| ASP | ATM Service Provider |
| ATM | Asynchronous Transfer Mode |
| BCD | Binary Coded Decimal |
| B-ISDN | Broadband Integrated Services Digital Network |
| BSI | British Standards Institute |
| CC | Country Code |
| CdPN | Called Party Number |
| CgPN | Calling Party Number |
| DCC | Data Country Code |
| DSP | Domain Specific Part |
| E.164(addr) | E.164 number used as an address |
| E.164(number) | E.164 used as a name |
| E.164N | Native E.164 number |
| E.164A | E.164 AESA (non-zero DSP) |
| E.164e | Embedded E.164 (zero DSP) |
| ESI | End System Indicator |

[1] Character may include numbers, letters and symbols

| | |
|---|---|
| IAM | Initial Address Message |
| IC | Identification Code |
| ICD | International Code Designator |
| IDI | Initial Domain Identifier |
| IDP | Initial Domain Part |
| IE | Information Element |
| IND | International Network Designator |
| IOTA | Identifiers for Organizations for Telecommunications Addresses |
| ISDN | Integrated Services Digital Network |
| ISO | International Organization for Standardization |
| MA | Main Address |
| N(S)N | National (Significant) Number |
| NNI | Network to Network Interface |
| NSAP | Network Service Access Point |
| NTE | Network Terminal Equipment |
| OSI | Open Systems Interconnection |
| PNNI | Private Network to Network Interface (ATM Forum signalling and routing protocol) |
| PSTN | Public Switched Telephone Network |
| SA | Subaddress |
| SEL | Selector |
| SN | Subcriber Number |
| TA | Transported Address |
| UNI | User-to-Network Interface |

# 5 Distinction between Address, Name and Number

## 5.1 Address

Identifies the location of a network termination point. An address is then a *locator*.

Identifies the interface at which the connection is to be delivered without regard to whether the connection continues beyond that interface.

It should not be portable from one network to another, or even necessarily from one part of a network to another.

There are exceptions, but every exception causes the routing system to have to deal with routes that cannot be aggregated and may increase the routing table size throughout the entire global broadband network.

## 5.2 Name

May be relatively independent of the ASP and so may be portable from one ASP to another, or from one part of a network to another.

Does not reflect the structure of a network.

However, it is important to note that an *address* may appear to be a *name* if it is constructed in such a way that it may not be used directly for routing by the network. For example, a private address will be constructed to reflect the structure of the private network but when this address appears at the public UNI it appears to be a *name* from the point of view of the ASP network.

## 5.3 Number

An E.164 number (as defined in E.164) can act in the "role" of both a name and an address.

Portability is reducing a number's role as an address. Numbers are increasingly acting in the role of a name only.

## 5.4 Use of terms

Throughout this Recommendation only the terms "name" or "address" shall be used. When an E.164 number is referred to it shall be denoted as E.164(addr) if its primary role is an address and it shall be referred to as E.164(name) if its primary role is a name.

# 6 Address descriptions

There are two types of address formats that have been identified for broadband networks. The two formats identified are:

- E.164 number defined in ITU-T Recommendation E.164 – in this context this is an E.164(addr).
- ATM End System Addresses (AESAs) as defined by the ATM Forum.

The term "ATM address" shall be used when referring to any ATM address that may be E.164N or AESA format.

## 6.1 E.164(addr) format

The E.164 number structure and format are described in Recommendation E.164 (1997).

### 6.1.1 E.164 formats

Currently, the international public telephone number structure formats are for:

1) Geographic areas: CC + N(S)N
2) Global services: CC + GSN
3) Networks$_{(E.164)}$: CC + IC + SN

### 6.1.2 Use of E.164 formats

If an E.164 number is to act in the role of an address, then it must provide information as to where the end user is, i.e. it is a locator. Therefore, only the geographic and Networks format can possibly act in the role of an address. The Global Services format is acting in the role of a name rather than a locator.

Thus it is recommended that for ATM addresses, E.164 formats are limited to the formats 1) and 3).

The National format [N(S)N] of an E.164 number may also act as a name. For example the N(S)N may contain a service code such as (0)800 (national freephone) or it may be a service access code such as 100 (UK Operator). In these examples the number is *primarily* acting in the role of a name rather than an address.

It is recommended that when an E.164 number is used as an ATM address, the geographic format of an E.164 number is restricted to the "international" format where the N(S)N is in the role of an address rather than a name.

ITU-T recognizes the continued use and support of E.164(addr) for use in ASP networks.

## 6.2 AESA format

There are many types of ATM End System Addresses (AESAs). The format of an AESA is illustrated in Figure 1. AESAs are always 20 octets in length. Although AESAs are based on the NSAP format as defined in Annex A of ITU-T Rec. X.213 | ISO/IEC 8348, they have different applications.

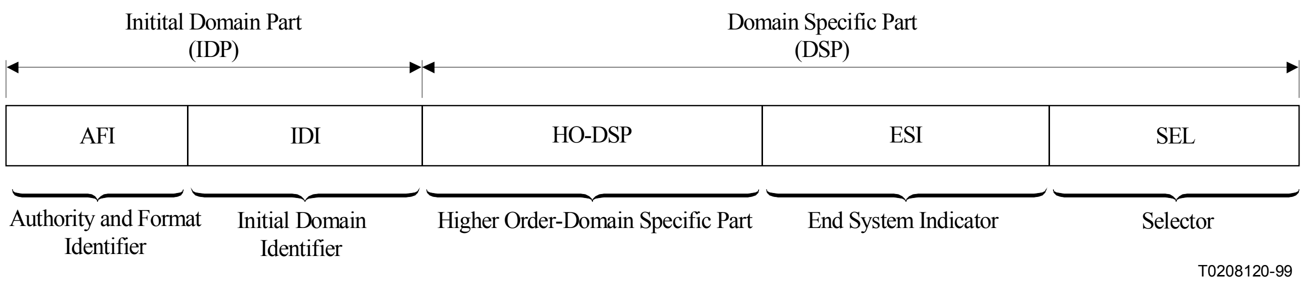



**Figure 1/E.191 – AESA format**

### IDP

The Initial Domain Part uniquely specifies an administration authority which has the responsibility for allocating and assigning values of the Domain Specific Part (DSP). The IDP consists of two fields, the Authority and Format Identifier (AFI) and the Initial Domain Identifier (IDI).

### AFI

The Authority and Format Identifier indicates the type of AESA that will follow. The length of this field is always 1 octet.

### IDI

The Initial Domain Identifier specifies the entity responsible for allocating values and format of the DSP within the assigned AFI. The length of this field may vary.

### DSP

The Domain Specific Part consists of 3 fields, the High Order-Domain Specific Part, the End System Indicator and the Selector. These fields vary in length depending on the AFI that is assigned. The values of the DSP are determined by the entity (IDI) indicated by the IDP.

### HO-DSP

The values and format of the High Order-Domain Specific Part field are determined by the entity indicated by the IDI. The length of this field may vary.

**ESI**

The End System Indicator identifies the ATM end system and may contain an IEEE MAC address. The length of this field is 6 octets.

**SEL**

The Selector is used by the end system for internal purposes. The length of this field is 1 octet.

### 6.3 Types of AESA

Current AESAs and their formats are provided in the following subclauses.

#### 6.3.1 ITU-IND AESA

The ITU-IND AESA was established for use by ASPs for the provision of public ATM services. See Figure 2.

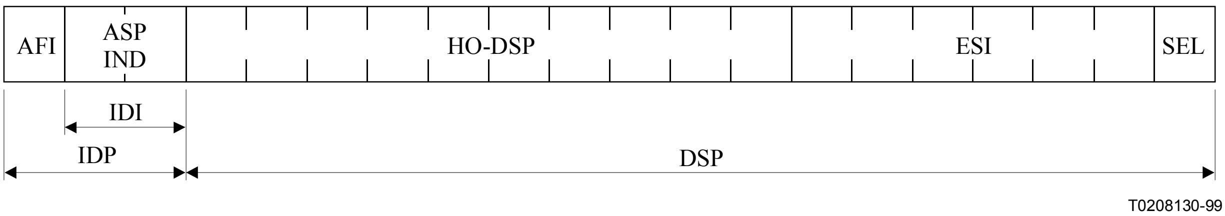



**Figure 2/E.191 – ITU-IND AESA Format**

The ITU-IND AESA format uses the individual AFI 76.

The ASP IND is a 3-octet identifier allocated by the ITU to the ASP. The HO-DSP is a 10-octet field for use by the ASP identified within the IDI. The remaining 7 octets of the ESI and SEL are for the end customers use.

The ITU-IND AESA is the addressing scheme that is the preferred method for use in ASP networks. The selection of three octets for the IDI is to provide sufficient numbering capacity (1 Million) to ensure that the resource will not exhaust within the near future.

#### 6.3.2 E.164 AESA

An E.164 AESA allows an E.164 number to be encapsulated within an AESA structure. The E.164 AESA can be used as an alternative to the ITU-IND.

Within this Recommendation, it is assumed that the E.164 number contained within the AESA has been assigned specifically for the purpose of B-ISDN addressing, i.e. it is not an existing E.164 that is already in use in another context. See Figure 3.

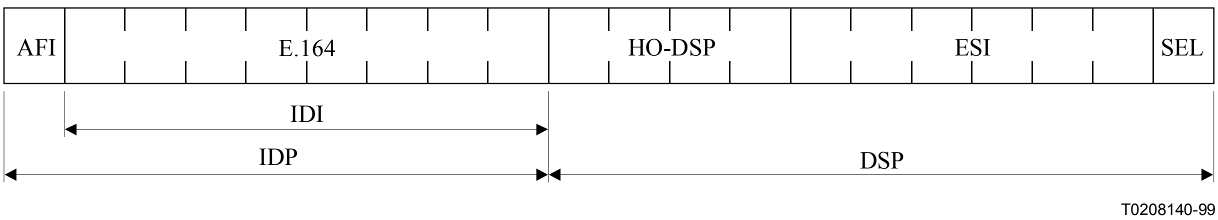



**Figure 3/E.191 – E.164 AESA**

The E.164 AESA uses the individual AFI value 45.

The IDI of an E.164 AESA contains an E.164(addr) and is always 8 octets in length.

The HO-DSP is a 4-octet field for use by the ASP identified within the IDI. The remaining 7 octets of the ESI and SEL are for the end customers use.

In order to encode the E.164(addr) within the AESA, a single semi-octet (1111 = F) is added to the end of the E.164 number to obtain an integral number of octets. The E.164 is then right justified within the IDI.

The E.164(addr) is padded with leading zeros. See Figure 4.

| | | | | |
|---|---|---|---|---|
| AFI = 45 | 0 0 0 4 4 1 7 1 2 5 0 1 2 3 4 F | HO-DSP | ESI | SEL |

E.164 number +44 171 250 1234 encoded in an AESA structure.

**Figure 4/E.191 – E.164 AESA Encoding**

There are two types of E.164 AESA formats:

- An E.164 AESA that has the DSP (HO-DSP, ESI and SEL) set to zero is known as an embedded AESA and shall be denoted as E.164e.
- An E.164 AESA that has a non-zero DSP and shall be denoted as E.164A.

The ITU-T recognizes the continued use and support of E.164 AESA for use in ASP networks.

### 6.3.3 ICD AESA

The ICD AESA was one of the original AESA formats specified by the ATM Forum. See Figure 5.

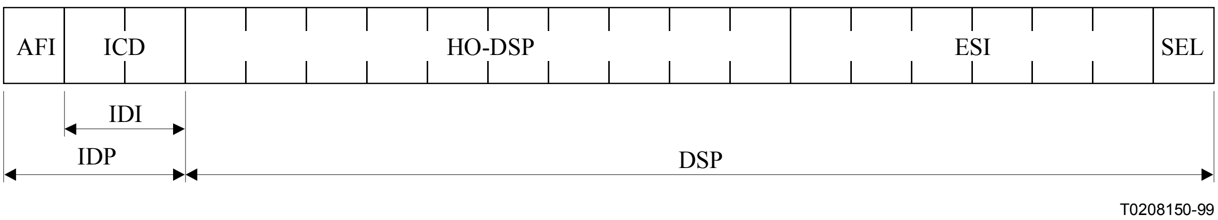



**Figure 5/E.191 – ICD AESA Format**

The ICD format AESA uses the individual AFI 47.

The IDI is a 4-digit (2 octets) number that identifies an organization. The ICD identifies an organizational authority responsible for allocating and assigning values of the DSP. The digits of the ICD will be left justified and padded on the right with the hexadecimal value "F" to fill the two octets.

The HO-DSP is a 10 octet field for use by the ASP identified within the IDI. The remaining 7 octets of the ESI and SEL are for the end customers use.

The IDI is allocated by ISO (International Organization for Standardization). All applications for an ICD must be submitted through a recognized **Sponsoring Authority**, usually the National Standards body of the applicant (e.g. ANSI for the USA), to the ISO Registration Authority. The ISO Registration Authority is the British Standards Institute (BSI), in accordance with the criteria established in ISO/IEC 6523.

Although a number of ICDs have been allocated to various organizations for the creation of ATM addresses, it is becoming increasingly difficult to obtain an ICD for this purpose. There are a number of reasons for this which include a shortage of ICD codes and the fact that ATM addressing was not the original intended use of the ICD scheme. The ICD scheme was intended to be a **coding** identification scheme rather than an **organization** identification scheme. Therefore, the ISO Registration Authority (BSI) has resisted allocating ICDs for the purpose of ATM addressing but instead has introduced a scheme, based on the ICD format, which is intended to satisfy the needs of organizations requiring ATM addresses. This scheme is known as the IOTA scheme – Identifiers for Organisations for Telecommunications Addresses (described in 6.3.3.1).

Given that implementation of the ICD AESA format exists in ASP networks, the ITU-T recognizes its use. The use of this format requires ATM protocols to support it and the support of this format between ASPs will be accomplished via bilateral agreements.

#### 6.3.3.1 IOTA AESA

This is a subset of the ICD AESA and was introduced by the BSI in the UK to satisfy the requirements of organizations who wish to use the ICD format for the creation of ATM addresses. See Figure 6.

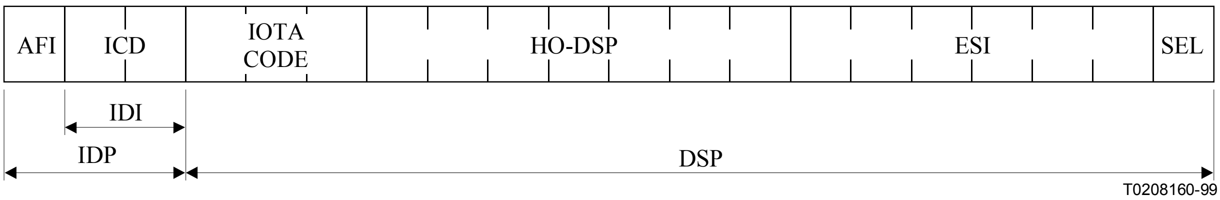



**Figure 6/E.191 – IOTA AESA Format**

The IOTA format uses the AFI 47 with the fixed ICD value of 0124.

The IOTA code is a 6-digit organization code which is allocated to the applicant by BSI. Thus, ATM addresses constructed using this format will have a fixed length header of 6 octets (AFI-47, ICD-0124, Organization code – 6 digits).

The rest of the HO-DSP is a 7-octet field for use by the organization identified within the IDI. The remaining 7 octets of the ESI and SEL are for the end customers use.

The ITU-T recommends the use of this format for private networks.

### 6.3.4 DCC AESA

The DCC AESA was one of the original AESA formats specified by the ATM Forum. See Figure 7.

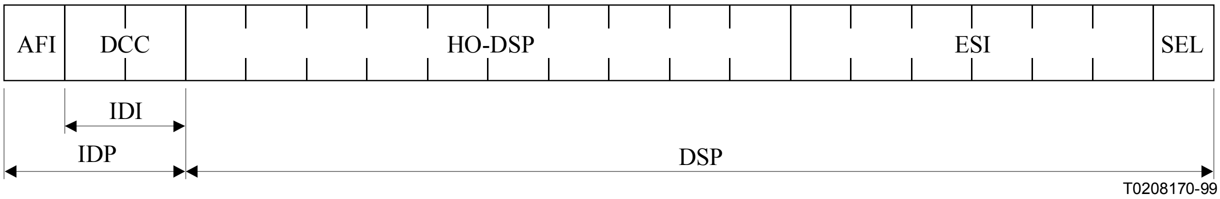



**Figure 7/E.191 – DCC AESA Format**

The DCC AESA format uses the individual AFI 39.

The length of the IDI field is two octets. The IDI element of the DCC AESA specifies the country in which an address is registered. This is a 4-digit ISO country code (the DCC value). The codes are given in ISO 3166. For example, the DCC value is 0826 for an address registered in the UK. The codes will be left justified and padded on the right with the hexadecimal value "F" to fill the two octets.

The ISO National Member Body, within each country, usually administers the scheme. A list of DCC Authorities and contact information may be found at http://www.fei.org.uk/fei/dcc-nsap.htm.

The structure of the DCC AESA, beyond the IDI, is determined by the ISO National member Body and may vary from country to country. Therefore, the length of the HO-DSP will vary from country to country. The remaining 7 octets of the ESI and SEL are for the end customers use.

Given that implementation of the DCC AESA format exists in ASP networks, the ITU-T recognizes its use. The use of this format requires ATM protocols to support it and the support of this format between ASPs will be accomplished via bilateral agreements.

The ITU-T recommends the use of the DCC AESA format in private networks or small ASP networks.

### 6.3.5 Local AESA

The local AESA is meant for use within private networks only. See Figure 8.

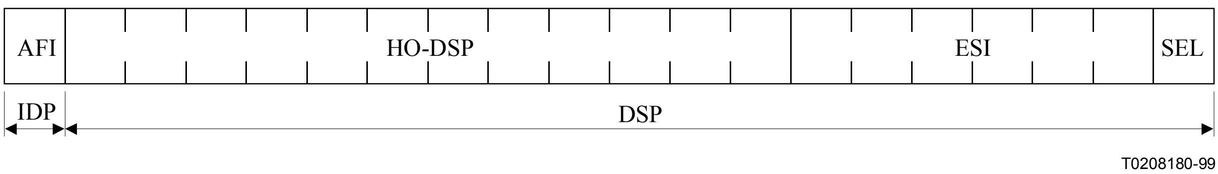



**Figure 8/E.191 – Local AESA Format**

The Local AESA format uses the individual AFI 49.

The total length of the IDP is two octets. In this particular AESA, the IDI is null. A Local AESA is to be used only within private networks since it is not a globally unique address. Consequently, this AESA is not recommended to interwork with other private networks or for interworking with ASP networks.

## 6.4 Subaddress

Most signalling protocols make provision for the carriage of a subaddress field. The subaddress is a sequence of decimal digits and/or binary octets which can be encoded into a 20-octet field, as a maximum. The subaddress may be a simple string of digits or it may be a structured address. For example, the subaddress may be an AESA as defined in 6.2.

The main purpose of the subaddress is to identify network entities or application processes beyond the public boundary. The subaddress information may be optionally present and may be offered to a customer as a subscription option. The ASP network shall not be required to examine or operate on any subaddress information. The information element containing the subaddress shall be carried transparently by the public B-ISDN.

## 6.5 Public Addresses

These public addresses that the ASPs use to identify termination points within their networks are ASP network centric (i.e. they usually have some relationship to the structure of the ASP network). Addresses are not portable from one network to another.

To enable interworking the "ASP network identifier" should be recognizable, and reachable by all other networks within the global ATM network. Public addresses may be aggregated into a small number of summarized addresses which may then be advertised in the top level route tables of the global ATM network.

It is important to note that a public address can be either a E.164N address or an AESA and should be allocated by the ASP to the private network (end user).

Valid public addresses are:

- ITU-IND AESA.
- E.164N.
- E.164 AESA.
- DCC AESA.
- ICD AESA.
- IOTA AESA.

This Recommendation proposes that ATM Service Providers (ASPs) use the ITU-IND AESA as the preferred method of B-ISDN addressing. Native E.164 and E.164 AESAs will continue to be supported. It is also recognized that other AESA formats are assigned and in use by ASPs.

## 6.6 Private addresses

The addresses that private networks use to identify termination points within their networks and are private network centric, i.e. they usually have some relationship to the structure of the private network. They are not portable between private networks.

These address types may be aggregated from the perspective of the private network. However, if they appeared at a public UNI they would look like a 'name' from the perspective of the public operator. Thus, from the perspective of the global ATM network, private ATM addresses cannot be aggregated efficiently.

Valid Private addresses are:

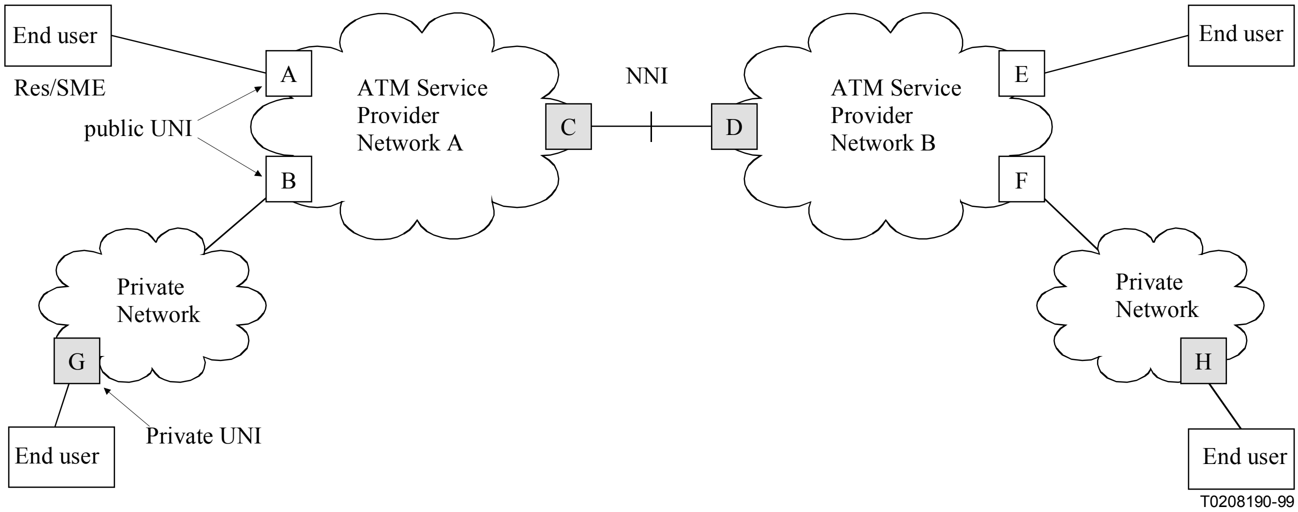
- DCC AESA.
- ICD AESA.
- IOTA.
- Local AESA.

## 7 Address interworking and routing

To enable address interworking between broadband networks it is desirable that all networks be able to understand and recognize all types of public ATM address, i.e. AESAs and E.164N. That is not to say that ATM networks are required to identify termination points using all types of ATM address but that they should be able to recognize and route on all types.

Note that if a network is capable of understanding and routing on one type of AESA, there is no technical reason why it may not be able to understand and route on other AESAs. Recognition of a large number of AESAs, irrespective of the types, is a network dimensioning issue. However, building networks using large numbers of different types of addresses may become complicated and requires caution.

Figure 9 will be used to describe interworking scenarios.




Res Residential
SME Small-medium Enterprise
UNI User-Network Interface
NNI Network-Network Interface

**Figure 9/E.191 – Address interworking**

For the purpose of explanation, the following address fields are described. These address fields are required to be supported within B-ISDN signalling systems. They are given general terms so that the theory may apply to any signalling protocol including ITU-T B-ISUP, ITU-T Q.2931 and ATM Forum PNNI.

- Main Address field (MA field) – This is the main address field that is used for routing.
- Subaddress field (SA field) – This address field may only be analysed and manipulated by the private network. It is transported transparently by the ASP network.
- Transported Address field (TA field) – This address field may only be analysed and manipulated by the ASP network[2].

[2] Within the ATM Forum signalling protocol PNNI this field is known as the Transported Address (TA).

## 7.1 Interworking between ASP networks

This subclause considers interworking between ASP networks, i.e. what addresses appear at the NNI (points C and D in Figure 9).

As discussed in 6.5, public addresses can be easily aggregated into manageable summarized addresses that can be loaded into the top level route tables of the global ATM network. This property allows easy interworking of ASP networks using public addresses.

As discussed in 6.6, from the perspective of the global ATM network, private ATM addresses cannot be summarized efficiently. It would not be practical to interwork ASP networks using private ATM addresses as theses addresses cannot be aggregated and would therefore cause a significant increase in the number of addresses advertised in the top level route tables.

It is recommended that interworking at the NNI between ASP networks should be based on public addresses. It is the responsibility of the preceding ASP network to ensure that a public address is delivered to the next ASP network at the NNI.

## 7.2 Interworking between ASP and private networks

This subclause considers interworking between ASP and private networks, i.e. the addresses that appear at the public UNI (points A, B, E and F in Figure 9).

There are many ways in which private networks can interwork with ASP networks, but this subclause considers only three ways. Those methodologies of interworking are given the following names:

- Bi-Level addressing:
  - Private network bi-level addressing;
  - Public network bi-level addressing.
- Single level addressing.

Appendix I gives more examples of interworking using ITU-T B-ISUP signalling.

### 7.2.1 Bi-level addressing

Bi-level addressing uses the concept of two addresses: one address is used to route across the ASP network (the public address) and one address is used to route across the private network (the private address).

Bi-level addressing assumes a means by which two addresses can be produced. This can be done manually or via an automatic translation facility. The usual process is that the private address is used as the "trigger" to look-up the matching public address.

The use of bi-level addressing is most likely to occur at public UNIs B and F in Figure 9, rather than at A or E. It is likely that a private network would use its own private address scheme. An end user would probably obtain a public address from their ASP.

#### 7.2.1.1 Private network bi-level addressing

In this scenario the private network has the ability to produce two addresses (i.e. the private network has either a manual or automatic translation facility).

Using the example in Figure 9 of a call from the End User at G to the End User at H. At the public UNI B two addresses appear:

- In the MA field is the public address of point F.
- In the SA field is the private address of point H.

The public address in the MA field is used to route the call across the public network. The SA field is carried transparently by the ASP networks and delivered to the destination private network.

Note that in B-ISDN signalling the carriage of the subaddress is by subscription.

Table 1 summarizes the addresses present in each field along the route of the call.

**Table 1/E.191 – Summary of addresses – Private network bi-level addressing call from G to H from Figure 9**

| | MA field | SA field | TA field |
|---|---|---|---|
| **G** | Private Addr (H) | Null | Null |
| **B** | Public Addr (F) | Private Addr (H) | Null |
| **C** | Public Addr (F) | Private Addr (H) | Null |
| **D** | Public Addr (F) | Private Addr (H) | Null |
| **F** | Public Addr (F) | Private Addr (H) | Null |
| **H** | Private Addr (H) | Null | Null |

### 7.2.1.2 Public network bi-level addressing

In this scenario the ASP network is performing the translation, from private to public address, on behalf of the private network.

Again using the example in Figure 9 of a call from the End User at G to the End User at H. At the public UNI B one address appears:

- In the MA field is the private address of point H.

The ASP network then performs a translation to discover the public address of point F that maps to the private address of point H.

- The ASP network then inserts the public address of point F in the MA field.
- The private address of point H is inserted into the TA field and carried without manipulation, across the ASP network, to point F.
- At point F the private address is restored to the MA field and delivered into the private network.

This is an example of a virtual private network.

Table 2 summarizes the addresses present in each field along the route of the call.

**Table 2/E.191 – Summary of addresses – Public bi-level addressing call from G to H from Figure 9**

| | MA field | SA field | TA field |
|---|---|---|---|
| **G** | Private Addr (H) | Null | Null |
| **B** | Private Addr (H) | Null | Null |
| **C** | Public Addr (F) | Null | Private Addr (H) |
| **D** | Public Addr (F) | Null | Private Addr (H) |
| **F** | Private Addr (H) | Null | Null |
| **H** | Private Addr (H) | Null | Null |

### 7.2.2 Single level addressing

Single level addressing uses the concept of a single address for routing across both the ASP and private networks. The advantage of single level address is that it does NOT require the use of a translation facility. However the disadvantage is that the customer loses some of their flexibility in using their own private addressing scheme.

Given that at the interface between ASP networks only public addresses should be used, single level addressing is based on the use of public addresses.

The public address is "split" such that the upper part of the address is assigned by the ASP operator and is used for routing across the public domain and the lower part of the address is assigned by the private network and is used for routing across the private domain.

In Figure 9, if single level addressing was implemented, point H would have a public address.

Table 3 summarizes the addresses present in each field along the route of the call.

**Table 3/E.191 – Summary of addresses – Single addressing call from G to H from Figure 9**

| | MA field | SA field | TA field |
|---|---|---|---|
| **G** | Public Addr (H) | Null | Null |
| **B** | Public Addr (H) | Null | Null |
| **C** | Public Addr (H) | Null | Null |
| **D** | Public Addr (H) | Null | Null |
| **F** | Public Addr (H) | Null | Null |
| **H** | Public Addr (H) | Null | Null |

Some examples of single level addressing are:

**Example 1 – E.164 address**

Direct-Dialling-In (DDI) is an example of single level addressing. The upper part of the address is used to route the call to the local exchange and the lower part (probably the last 4 digits) is assigned by the private network to number end points on their network (on-site addressing).

**Example 2 – AESA**

The 20-octet AESA is split into, say, an 11–9 format. The first 11 octets are assigned by the ASP network and are used to route to the destination public UNI. The ASP allows the private network to assign the last 9 octets. The last 9 octets are used for routing across the private network.

## 8 Recommendation history

Recommendation E.191 – First issue 1996; Second issue March 2000.

APPENDIX I

## I.1 Example of public bi-level addressing using B-ISUP

In the specific example shown in Figure I.1, the originating network performs a translation from a private AESA format to a public E.164 address. Where both networks are using public AESAs, the TA field described in clause 7 will be required to transport the original private AESA and the AESA for CdPN and CgPN field will not be used. The destination network receives an IAM with both an E.164 address in the CdPN parameter and the private AESA in the AESA for CdP parameter. The destination network may use one or both of these parameters to determine the UNI to which to deliver the call.

At the terminating UNI, the original CdPN in the SETUP message, which is carried in the AESA for CdP parameter, may be used to populate the CdPN in the SETUP. This function may be performed on a subscription basis or by negotiation between the originating and terminating ASP networks.

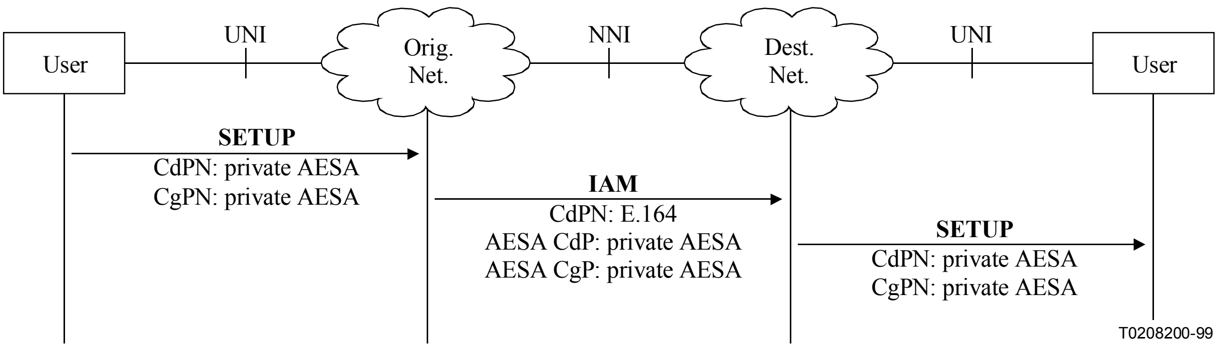



**Figure I.1/E.191 – Translation at the Originating ASP Network**

## I.2 Use of Transit Network Selection (TNS) parameter

Carrier identification codes are carried in the TNS and are subject to national regulations. Codes are allocated to operators at a national level. TNS overrides normal Called Party Number based routing. If the TNS is present in the SETUP message, it will be used for routing purposes. The call shall be routed to the carrier indicated in the TNS. The use of the TNS parameter is limited at an international level as the Carrier Codes may not be automatically recognized.

The following is an example of Private bi-level addressing using B-ISUP using the TNS Parameter. In this example the Carrier Code in the TNS is used for routing through the ASP network.

In the scenario shown in Figure I.2, the originating ASP network uses the Transit Network Selection (TNS) received in the SETUP to deliver the call to the carrier specified by the TNS. For example, a private AESA in the CdPN along with the TNS will be mapped into an IAM containing the AESA in the AESA for CdP and a CdPN parameters with no address digits in the CdPN parameter. Note that the TNS is removed by the originating network before the call is routed to the transit network. In this example the transit network and destination network are the same, i.e. the terminating UNI is on the transit/destination network.

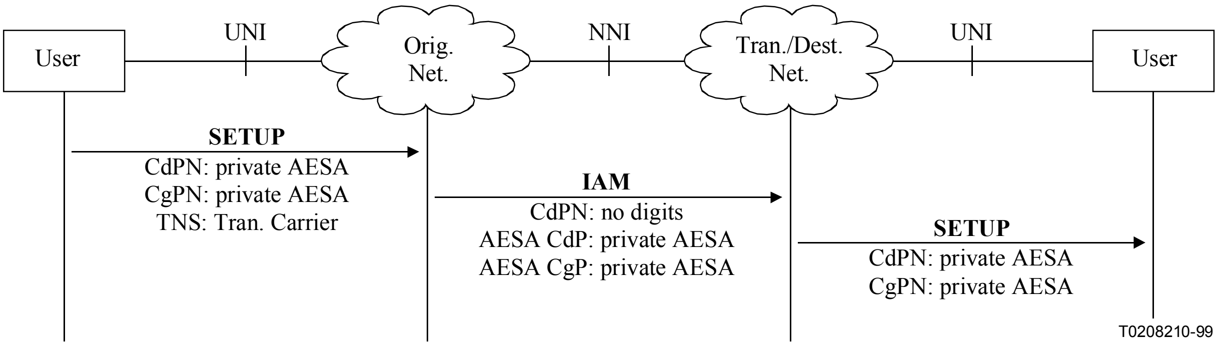



**Figure I.2/E.191 – Originating private network uses TNS**

### I.3 Example of single level addressing using B-ISUP

This example makes use of B-ISUP E.164 Called Party Number Not Required.

In the scenario shown in Figure I.3, the originating ASP network codes the CdPN parameter to have no digits and copies the public AESA into the AESA for CdP parameter. In this example, the originating network delivers the call to the destination network, which is also capable of call setup using non-E.164 AESAs.

Once the call is received at the destination network, the AESA for CdP parameter is used to deliver the call to the terminating UNI. At the terminating UNI, the original CdPN in the SETUP message, which is carried in the AESA for CdP parameter, may be used to populate the CdPN in the SETUP. This function may be performed on a subscription basis or by negotiation between the originating and terminating ASP networks.

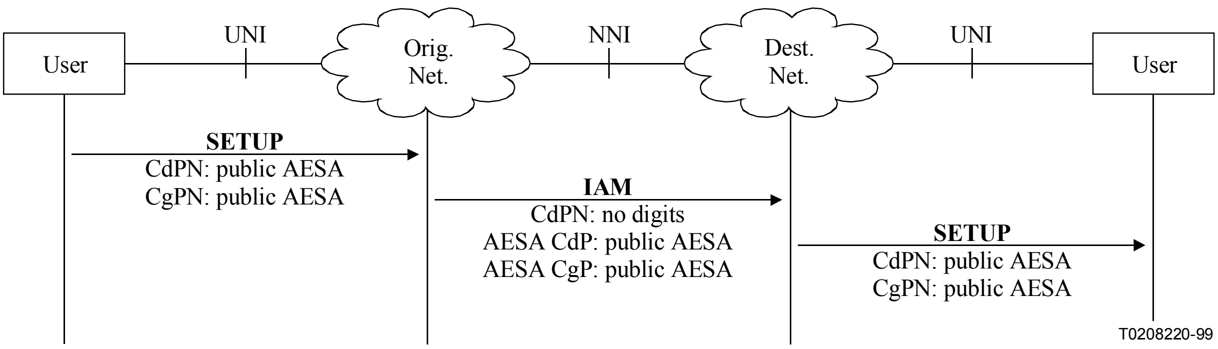



**Figure I.3/E.191 – Originating network generates CdPN with no digits**

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