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SERIES X: DATA NETWORKS AND OPEN SYSTEM
COMMUNICATIONS

Public data networks – Network aspects

**Arrangements for the interworking of the E.164
and X.121 numbering plans for frame relay and
ATM networks**

ITU-T Recommendation X.124

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION X.124**ARRANGEMENTS FOR THE INTERWORKING OF THE E.164 AND X.121
NUMBERING PLANS FOR FRAME RELAY AND ATM NETWORKS****Summary**

This Recommendation defines the procedures applicable for the purpose of numbering plan interworking between ATM networks which use the E.164 numbering plan and Public Frame Relay Data Networks which may use either the X.121 numbering plan or the E.164 numbering plan. The principles for interworking between the E.164 and X.121 numbering plans covered in this Recommendation are illustrated by various examples. The scenario (for FR/ATM service interworking) where the ATM terminal is identified by an AESA (NSAP) is also illustrated.

Source

ITU-T Recommendation X.124 was prepared by ITU-T Study Group 7 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 18th of June 1999.

FOREWORD

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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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration*, *ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

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Recommendation X.124

ARRANGEMENTS FOR THE INTERWORKING OF THE E.164 AND X.121 NUMBERING PLANS FOR FRAME RELAY AND ATM NETWORKS

(Geneva, 1999)

1 Introduction

Public B-ISDN (ATM) networks utilize the E.164 numbering plan, whilst Public Frame Relay Data Networks (PFRDNs) may be numbered under either the X.121 numbering plan or the E.164 numbering plan. A call from a B-ISDN (E.164) to a PFRDN (X.121), a PFRDN (X.121) to a PFRDN (E.164) and calls routed through networks using a different numbering plan to that of the originating or destination network are examples of the need for numbering plan interworking. Numbering plan interworking is a fundamental requirement for the successful completion of calls between data networks utilizing different numbering plans.

This Recommendation defines the general procedures applicable to numbering plan interworking between:

- Public Frame Relay Data Networks which utilize differing numbering plans;
- Public Frame Relay Data Networks and B-ISDNs (Public ATM Networks).

The numbering and addressing principles for B-ISDNs are described in Recommendation E.191. The numbering principles for public data networks are defined in Recommendation X.121.

NOTE – Within this Recommendation the term Public Frame Relay Data Network can be used interchangeably with the term Public Data Network providing the Frame Relay Data Transmission Service. The term ATM Network can be used interchangeably with the term B-ISDN.

2 Scope

2.1 The scope of this Recommendation is to define the procedures applicable for the purpose of numbering plan interworking between B-ISDN (Public ATM Networks) and Public Frame Relay Data Networks utilizing the E.164 numbering plan and those Public Frame Relay Data Networks which use the X.121 numbering plan.

2.2 The principles for interworking between the E.164 and X.121 numbering plans covered in this Recommendation are illustrated by various examples which involve only Frame Relay calls. The scenario (for FR/ATM service interworking) where the ATM terminal is identified by an AESA (NSAP) is also illustrated. The numbering plan interworking principles utilize the Numbering Plan Identifier (NPI) method.

2.3 Interworking involving two or more Frame Relay or ATM Networks is included in the scope of this Recommendation.

2.4 This Recommendation applies to numbering plan interworking across network boundaries. Its applicability to calls within a single country is a national matter.

3 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 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 I.555 (1997), *Frame Relaying Bearer Service interworking*.
- ITU-T Recommendation X.36 (1995), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for public data networks providing frame relay data transmission service by dedicated circuit*.
- ITU-T Recommendation X.36/Amd.1 (1996), *Switched Virtual Circuit (SVC) signalling and refinements of Permanent Virtual Circuit (PVC) signalling*.
- ITU-T Recommendation X.36/Amd.2 (1997), *Frame transfer priority*.
- ITU-T Recommendation X.36/Amd.3 (1998), *Frame discard priority, service classes, NSAP signalling and protocol encapsulation*.
- ITU-T Recommendation X.46 (1998), *Access to FRDTS via B-ISDN*.
- ITU-T Recommendation X.76 (1995), *Network-to-network interface between public data networks providing the frame relay data transmission service*.
- ITU-T Recommendation X.76/Amd.1 (1997), *Switched virtual circuits*.
- ITU-T Recommendation X.76/Amd.2 (1998), *Frame relay service classes and priorities*.
- ITU-T Recommendation X.121 (1996), *International numbering plan for public data networks*.
- ITU-T Recommendation X.122 (1998), *Numbering plan interworking for the E.164 and X.121 numbering plans*.
- ITU-T Recommendation X.123 (1996), *Mapping between escape codes and TOA/NPI for E.164/X.121 numbering plan interworking during the transition period*.
- ITU-T Recommendation X.300 (1996), *General principles for interworking between public networks and between public networks, and other networks for the provision of data transmission services*.
- ITU-T Recommendation X.301 (1996), *Description of the general arrangements for call control within a subnetwork and between subnetworks for the provision of data transmission services*.

4 Definitions

A list of terms and their definitions relating to numbering are contained in Recommendations E.164 and X.121.

5 Abbreviations

This Recommendation uses the following abbreviations:

AESA	ATM End System Address
ALT-ADD	Alternative Address
ATM	Asynchronous Transfer Mode
AU	Access Unit
B-ISDN	Broadband Integrated Services Digital Network
CSM	Call Set-up Message
DCE	Data Circuit-terminating Equipment
DNIC	Data Network Identification Code

DTE	Data Terminal Equipment
FR	Frame Relay
FRDTS	Frame Relay Data Transmission Service
ND	Number Digits
NPI	Numbering Plan Identification
NSAP	Network Service Access Point (address)
PDN	Public Data Network
PFRDN	Public Frame Relay Data Network
STE	Signalling Terminal Equipment
TON	Type of Number

6 Interworking

The sample call flows shown in the figures are from terminal to terminal. The application of this Recommendation includes the following numbering plan interworking scenarios:

- calls from/to a frame relay terminal on a PFRDN numbered under X.121, to/from a PFRDN numbered under E.164;
- calls from/to an ATM terminal with frame relay capabilities on an ATM Network numbered under E.164, to/from a frame relay terminal on a PFRDN numbered under X.121;
- calls from/to a frame relay terminal on a PFRDN numbered under X.121, utilizing an ATM Network as a transit network for calls to/from a frame relay terminal on a PFRDN numbered under X.121;
- calls from/to a frame relay terminal on a PFRDN numbered under X.121, utilizing an ATM Network as a transit network for calls to/from a frame relay terminal on a PFRDN numbered under E.164;
- calls from/to a frame relay terminal on a PFRDN numbered under X.121, to/from an ATM terminal on an ATM Network numbered under E.164 (service interworking);
- calls from/to a frame relay terminal on a PFRDN numbered under X.121, to/from an ATM terminal on an ATM Network identified by an AESA (OSI NSAP) (service interworking).

NOTE – The interworking scenario for calls from/to a frame relay terminal on an ATM Network numbered under E.164, utilizing a PFRDN numbered under X.121 as a transit network for calls to/from a frame relay terminal on an ATM Network numbered under E.164 is for further study.

6.1 Numbering plans

The two numbering plans included in the arrangements shown in this Recommendation are the E.164 and the X.121 numbering plans.

6.1.1 Escape codes

For the purpose of number plan interworking for the provision of Frame Relay Data Services, escape codes are not used.