



# COVERING NOTE

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GENERAL SECRETARIAT INTERNATIONAL TELECOMMUNICATION UNION

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Geneva, 17 March 2004

ITU – TELECOMMUNICATION  
STANDARDIZATION SECTOR

**Subject: Erratum 1 (03/2004) to**

ITU-T Recommendation Q.2111 (1999) Amendment 2 (2002), *B-ISDN ATM adaptation layer – Service specific connection oriented protocol in a multilink and connectionless environment (SSCOPMCE) – Amendment 2: API for SSCOPMCE over Ethernet*

**Renumber all clauses of new Annex F (API for SSCOPMCE over Ethernet) by adding "F." as follows:**

*Renumber clauses:*

1, 2, 3, 4, 5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7

*respectively into:*

F.1, F.2, F.3, F.4, F.5, F.5.1, F.5.2, F.5.3, F.5.4, F.5.5, F.5.6, F.5.7



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

# Q.2111

## Amendment 2

(04/2002)

SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – Signalling ATM adaptation layer  
(SAAL)

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B-ISDN ATM adaptation layer – Service specific  
connection oriented protocol in a multilink and  
connectionless environment (SSCOPMCE)

**Amendment 2: API for SSCOPMCE over  
Ethernet**

ITU-T Recommendation Q.2111 – Amendment 2

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*For further details, please refer to the list of ITU-T Recommendations.*

# **ITU-T Recommendation Q.2111**

## **B-ISDN ATM adaptation layer – Service specific connection oriented protocol in a multilink and connectionless environment (SSCOPMCE)**

### **Amendment 2 API for SSCOPMCE over Ethernet**

#### **Summary**

This amendment to ITU-T Rec. Q.2111 provides an Application Programming Interface for SSCOPMCE over Ethernet. It is being provided to ease the incorporation of SSCOPMCE into communication systems utilizing Ethernet.

#### **Source**

Amendment 2 to ITU-T Recommendation Q.2111 was prepared by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 13 April 2002.

11-01-2002

## FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 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

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As of the date of approval of this Recommendation, ITU had 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.

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# ITU-T Recommendation Q.2111

## **B-ISDN ATM adaptation layer – Service specific connection oriented protocol in a multilink and connectionless environment (SSCOPMCE)**

### **Amendment 2 API for SSCOPMCE over Ethernet**

#### **1) Clause 2.2 – Bibliography**

*Add the following reference:*

[23] ISO/IEC 8652:1995, *Information technology – Programming languages – Ada.*

#### **2) Clause 4 – Abbreviations**

*Add the following definition alphabetically:*

API Application Programming Interface

#### **3) Clause 5.3 – Modes of Operation**

*Add the following sentence at the end of the paragraph immediately following Figure 2:*

In addition, Annex F provides an Application Programming Interface (API) for SSCOPMCE over Ethernet.

#### **4) Annex F**

*Add new Annex F (API for SSCOPMCE over Ethernet) as follow:*

### **Annex F**

#### **API for SSCOPMCE over Ethernet 1**

##### **1 Introduction**

Annex E to this Recommendation specifies the deployment of SSCOPMCE on top of the connectionless service provided by IEEE 802.3 Ethernet networks. The primary driver for the configuration is to realize an open-systems databus for closed-loop systems.

Applications can utilize the following services of SSCOPMCE through the SAP offered by the SSCF at the UNI [12]:

- Unacknowledged transfer of data;
- Assured transfer of data;
- Transparency of transferred information;
- Establishment and release of connections for assured transfer of data.

Whereas the main body of the Recommendation and Annex E contain the specifications necessary to develop a product based on an Ethernet network interface card, this annex specifies an application programming interface (API) to the SAP. The reason for specifying an API is to drive development tool and/or real-time operating system vendors to offer a standard, open and familiar



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interface for software developers to take advantage of the network capabilities offered by an Ethernet-based databus.

## 2 Objectives of the Ethernet Databus API

The Ethernet Databus API is relatively small and self-contained, allowing a programmer to access SSCOPMCE services when such services operate over an Ethernet datalink layer. Two objectives were used in designing an API:

- The API should be based on the notion of sockets, which has been widely used in the majority of existing network APIs for desktop and real-time operating systems. Sockets essentially treat each network connection as a stream into which bytes can be written-to or read-from, allowing them to be an extension of familiar file I/O concepts.
- The API should include provisions for exception-handling in order to manage run-time errors.

## 3 Overview of the Ethernet Databus API Implementation

The Ethernet Databus API is written in the Ada 95 programming language [3]. The choice of Ada is based on its widespread use in aerospace and defense systems, one of the application areas driving the specification of Annex E/Q.2111. Consequently, an Ada-based API will permit the migration of existing system architectures toward an Ethernet-based databus. In addition, new system architectures may be based on it. Such an API will also offer a standard programming interface for use with an Ethernet-based databus.

The Ada-based API defines the following types (objects):

- **EtherAddress:** Represents an Ethernet address.
- **EtherSocket:** Implements a client-side socket that utilizes the assured data transfer capabilities of SSCOPMCE. Data is transported in one or more sequenced-data (SD) PDUs within Ethernet frames.
- **EtherTag:** Contains the attributes associated with the 802.1 tag type [22].
- **EtherServerSocket:** Implements a server-side socket that utilizes the assured data transfer capabilities of SSCOPMCE. Data is transported in one or more sequenced-data (SD) PDUs within Ethernet frames.
- **Datagram:** Creates a datagram referring to an un-numbered user data (UD) PDU.
- **DatagramSocket:** Creates a socket to send or receive a datagram.
- **MulticastSocket:** Creates a multicast socket to send or receive a datagram. Data is transported in one or more un-numbered user data (UD) PDUs. Multicast operation is based on the GARP Multicast Registration Protocol (GMRP) [21].

The fact that only a few types are defined is based in large part to the streamlined mapping of protocol layers allowed in Annex E/Q.2111. From a definition viewpoint, these types, and the associated operations on these types, are contained in the package Ethernet Databus. A driver associated with a network interface card must be compliant with it. From an implementation viewpoint, these types are designated as private, and, like the specification of associated operations, are outside the scope of this Recommendation. This has been done to allow flexibility in the implementation and evolution of the API.