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# ND1012:2006/06

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(PNO-ISC/SPEC/012)

Interconnect Stream Control Transmission Protocol (SCTP) and  
Adaptation Layers

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**PNO-ISC SPECIFICATION NUMBER 012**  
**Interconnect Stream Control Transmission Protocol (SCTP) and Adaptation**  
**Layers**

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### 0.3 History

Revision	Date of Issue	Description
Issue 1.0 Draft A	January 2002	First Draft
Issue 1.0 Draft B	April 2002	Second Draft
Issue 1.0 Draft C	April 2002	Third Draft
Issue 1.0 Draft D	June 2002	Fourth Draft
Issue 1.0 Draft E	October 2002	Fifth Draft
Issue 1.0 Draft F	December 2002	Sixth Draft
Issue 1.0 Draft G	December 2002	Seventh Draft
Issue 1.0 Draft H	December 2002	Eight Draft
Issue 1.0 Draft J	May 2003	Ninth Draft. Updated to combine with M3UA specification.
Issue 1.0 Draft K	June 2003	Updated following final document review.
Issue 1.0 Draft L	June 2003	Pages 2 and 3 re-ordered after comment at June ISC meeting
Issue 1.0	June 2003	First Issue
Issue 2.0 Draft A	July 2005	SCTP specification updated to include use for carrying SIP.
Issue 2.0 Draft B	September 2005	Editorial, changed to NICC document ND format, Normative Text section 0.2 deleted.
Issue 2.0 Draft C	November 2005	Editorial, changed reference INFO 007 issue no, added/changed abbreviations.
Issue 2.0 Draft D	December 2005	Minor editorial changes, submitted to TSG for final review.
Issue 2.0	June 2006	Second Issue – PNO Title page 3 added. ND reference added to SPEC and INFO references. Minor editorial to 0.7.2.

### 0.4 Issue Control

SECTION	ISSUE	DATE
All	Issue 1.0 Draft A	January 2002
All	Issue 1.0 Draft B	April 2002
All	Issue 1.0 Draft C	April 2002
All	Issue 1.0 Draft D	June 2002
0,2	Issue 1.0 Draft E	October 2002
All	Issue 1.0 Draft F	December 2002
All	Issue 1.0 Draft G	December 2002
0.5	Issue 1.0 Draft H	December 2002
All	Issue 1.0 Draft J	May 2003
All	Issue 1.0 Draft K	June 2003
All	Issue 1.0 Draft L	June 2003
All	Issue 1.0	June 2003
0,1, 2	Issue 2.0 Draft A	July 2005
0	Issue 2.0 Draft B	September 2005
0,1,3,4	Issue 2.0 Draft C	November 2005
0,1	Issue 2.0 Draft D	December 2005
All	Issue 2.0	June 2006

## 0.5 Normative References

- [1] ETSI TS 102 142, "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Message of SS7 over IP); Message transfer part 3 User Adaptation layer (M3UA)," version 1.1.1, May 2003.
- [2] ETSI TS 102 144, "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Message of SS7 over IP); Stream Control Transmission Protocol (SCTP)," version 1.1.1, May 2003.
- [3] R. R. Stewart, et al., "Stream Control Transmission Protocol," RFC 2960, IETF, October 2000.
- [4] G. Sidebottom, et al., "Signalling System 7 (SS7) Message Transfer Part 3 (MTP3)-User Adaptation Layer (M3UA)," RFC 3332, IETF, September 2002.
- [5] ND1005:2000/08 (PNO-ISC/SPEC/005, Issue 3), C7 Interconnect Message Transfer Part (MTP).
- [6] ND1107:2001/10 (PNO-ISC/INFO/007, Issue 3.1), UK Interconnect use of SCCP and MTP.
- [7] ND1017:2006/06 (TSG/SPEC/017), Interworking between the Session Initiation Protocol (SIP) and the ISDN User Part (UK ISUP).
- [8] ND1011:2002/10 (PNO-ISC/SPEC/011, Issue 1), ATM Transport for UK Interconnect.
- [9] ND1119:2006/06 (PNO-ISC/INFO/019, Issue 1), UK Interconnect use of Signalling for packet-based PSTN/ISDN.
- [10] ITU-T Q.706 (03/93), Signalling System No.7, Message Transfer Part, Signalling Performance.
- [11] ITU-T Q.716 (03/93), Signalling System No.7, Signalling Connection Control Part (SCCP performance).
- [12] ITU-T Q.766 (03/93), Performance objectives in the integrated services digital network application.
- [13] S. Kent & R. Atkinson, "Security Architecture for the Internet Protocol," RFC 2401, IETF, November 1998.
- [14] A. Jungmaier, E. Rescorla & M. Tuexen, "Transport Layer Security over Stream Control Transmission Protocol," RFC 3436, IETF, December 2002.

## 0.6 Informative References

**Note:** The IETF Internet drafts listed below are current at the time of writing. It is advisable to reference the latest available IETF Internet Draft for information.

ND1001:1999/06 (PNO-ISC/SPEC/001, Issue 1), Point Codes for Network Interconnect in the UK.

ITU-T Q.704 (07/96), Signalling System No.7, Message Transfer Part, Signalling Network Functions and Messages.

J. Pastor-Balbas & K. Morneault, "M3UA Implementor's Guide", draft-ietf-sigtran-m3ua-implementors-guide-03.txt, IETF, February 2003.

R. Stewart, et al., "Stream Control Transmission Protocol (SCTP) Implementer's Guide", draft-ietf-tsvwg-sctpimpguide-08.txt, IETF, 26<sup>th</sup> February 2003.

J. Loughney, M. Tuexen & J. Pastor-Balbas, "Security Considerations for SIGTRAN Protocols," draft-ietf-sigtran-security-02.txt, IETF, January 2003.

S. M. Bellovin, et al., "On the use of SCTP with IPsec," draft-ietf-ipsec-sctp-06.txt, IETF, April 2003.

## 0.7 Glossary of terms

### 0.7.1 Abbreviations

AS	Application Server
ASCII	American Standard Code for Information Interchange
ASP	Application server process
C7	CCITT Signalling System Number 7
CP	Communications Provider
DUPU	Destination user part unavailable message
ETSI	European Telecommunications Standards Institute
IETF	Internet Engineering Task Force
IP	Internet Protocol
ISC	Interconnect Standards Committee (replaced by TSG WP)
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunications Union (Telecoms Sector)
M3UA	MTP3 User adaptation layer
MTP	Message Transfer Part
MTP3	Message Transfer Part - Level 3
MTU	Maximum Transmission Unit
NICC	Network Interoperability Consultative Committee
PNO-IG	Public Network Operators' – Interest Group (replaced by TSG)
PNO-ISC	Public Network Operators' – Interconnect Standards Committee (replaced by TSG)
PSTN	Public Switched Telephone Network?
RFC	Request for Comments
SCCP	Signalling Connection Control Part
SCN	Switched Circuit Network
SCON	Signalling congestion message
SCTP	Stream Control Transmission Protocol
SG	Signalling gateway
SIP	Session Initiation Protocol
SP	Signalling point
SPAN	Services and Protocols for Advanced Networks
SS7	Signalling System Number 7
SSCOP	Service Specific Connection Oriented Protocol
TFC	Transfer controlled message
TSG	Technical Steering Group
UK	United Kingdom of Great Britain and Northern Ireland
WP	Working Party

### 0.7.2 Definitions

Congestion with the priority option is not used for UK interconnect.

The ETSI specifications TS 102 142 [1] and TS 102 144 [2] use the term 'not required'. For UK Interconnect use this term is defined as follows,

Not required	It is not necessary for either the underlying functionality or signalling procedures associated with the service/feature to be supported by the implementation concerned for that implementation to qualify as conformant to the specification. Refer to 0.9. Note 1: Interconnected or communicating implementations that provide support of the service/feature/message/parameter identified will not be considered as non-conformant to the specification. Note 2: Implementations shall not rely on "not-required" features being disabled (or enabled). Note 3: The normal compatibility rules shall apply to the messages, parameters and codepoints needed to support the feature/service.
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## 0.8 Scope

This document specifies the requirements of the Stream Control Transmission Protocol (SCTP) for the transport of applications' signalling messages across a UK national interconnect between Public Networks. This document also specifies the requirements for the MTP3 user adaptation layer (M3UA) when required to support certain upper layer protocols. This SCTP specification is appropriate to interconnect within the UK network for end node to end node configuration. Where M3UA is used, only the signalling gateway to 'end node' configuration is supported.

This specification was proposed by the NICC-TSG because a need was identified to support the transport of signalling over IP within the UK.

This specification is an extension to the ETSI specifications TS 102 142 [1] and TS 102 144 [2] and includes additions specific to interconnect within the UK.

It must also be noted that this specification might only form part of an agreement and support of further functionality over an interconnect may be as part of a bilateral agreement.

## 0.9 Treatment of Items 'Not Required' or 'Shall Not Be Sent'

The ETSI specifications TS 102 142 [1] and TS 102 144 [2] use the terms 'not required' and 'shall not be used'. For UK Interconnect, the processing of received messages and/or parameters marked either as 'not required' or as 'shall not be sent' shall be according to the capabilities of the receiving node and may either be to discard them or to respond to them in a manner allowed by this specification. For preference these events shall optionally be reported to management.

**END OF ND1012 §0**

## 1 Introduction

The NICC-TSG has produced this UK extension to ETSI TS 102 144 [2] and ETSI TS 102 142 [1]. The description of SCTP contained in this document, together with [2], specifies the minimum set of features and capabilities that shall be supported by an implementation of the protocol for national interconnect between operators, using SS7 and SIP.

Whilst there is no current obligation on any CP to offer a UK SCTP and/or UK SCTP/M3UA interconnect, if any such interconnect is offered then as a minimum the functionality outlined in this specification shall be used to ensure interoperability between UK networks.

The base SCTP document for TSG is,

ETSI TS 102 144 [2]

The base SCTP document for ETSI is,

IETF RFC 2960 [3]

All functionality outlined as mandatory in [2 & 3] is considered as mandatory for TSG. Any functionality outlined in IETF RFC 2960 as 'SHOULD' & 'MUST' is to be considered as mandatory (SHALL). Any behaviour outlined as 'SHOULD NOT' & 'MUST NOT' is to be read as 'SHALL NOT'.

The MTP3-User adaptation layer (M3UA) is also specified, and together with ETSI TS 104 142 [1], specifies the minimum set of features and capabilities that shall be supported by an implementation where M3UA is used to support national SS7 interconnect between operators.

The base M3UA document for TSG is,

ETSI TS 102 142 [1]

The base M3UA document for ETSI is,

IETF RFC 3332 [4]

All functionality outlined as mandatory in [1 & 4] is considered as mandatory for TSG. Any functionality outlined in IETF RFC 3332 as 'SHOULD' & 'MUST' is to be considered as mandatory (SHALL). Any behaviour outlined as 'SHOULD NOT' & 'MUST NOT' is to be read as 'SHALL NOT'.

Note: The above documents [3 and 4] are for proposed internet standard protocols, and active discussion and testing continues within the IETF. Implementations shall take note of IETF updates, guidelines and changes that complement or supersede RFC 2960 and RFC 3332. As changes to functionality, features and capabilities are made to RFC 2960 and/or RFC3332; this baseline document for TSG Transport may also need to be updated.

As further ETSI specifications of functionality and adaptation layers are completed, this document will be updated to include key functionality agreed by TSG.

**END OF ND1012 §1**

## **2 General**

### **2.1 SIGTRAN Security**

The security considerations listed in RFC 2960 [3] and RFC 3332 [4] should be taken into account for UK interconnect. This is under study in the TSG security group.

### **2.2 Timers**

Timer values used should be within the functional requirements of the upper protocol layers. Refer to [9].

**END OF ND1012 §2**

### **3 SCTP**

Reference numbers contained within brackets ( ) refer to the applicable sections in ETSI TS 102 144 [2].

#### **3.1 SCTP Features**

- (4.3) The endpoint shall allow the MTU size for each path to be manually configured, within the range specified in Table 1 of [2].

#### **3.2 SCTP Parameters**

The default SCTP parameters defined in RFC 2960 [3] (and listed in Table 1 of [2]) are intended to allow SCTP to co-exist seamlessly with TCP in the Internet. The default timer and parameter values of SCTP are considered to be unsuitable to meet the performance requirements of SS7 user parts, especially during failure, congestion and packet loss situations. Hence they are not suitable for UK interconnect purposes. SCTP implementations shall support configurable parameters as defined in Table 1 of [2]. Refer to PNO-ISC/INFO/019 [9] for guidance on choosing the actual timer and parameter values.

END OF ND1012 §3

## 4 M3UA

Reference numbers contained within brackets ( ) refer to the applicable sections in RFC 3332 [4].

### 4.1 General

#### 4.1.1. Performance requirements

Performance requirements are outside the scope of this document. However, the network implementation should take into account the performance requirements as outlined in [10], [11] and [12].

#### 4.1.2. Stream requirements

A minimum number of 2 streams shall be supported. If the peer endpoint supports only 1 incoming stream, or outgoing stream the endpoint shall abort the association and may report the failure to initialise the association to layer management. No restriction is placed on the maximum number of streams to be supported by an endpoint, within the constraints of RFC 2960 [3].

### 4.2 Functional Areas

- (1.4.2.4) The behaviour if no active ASP is available is a nodal function. A description of recommended functionality is contained in [9].
- (1.4.6) When a SG determines that the transport of SS7 messages to a signalling point is encountering congestion, the SG shall trigger SS7 MTP3 TFC management messages to originating SS7 nodes, as per the congestion procedures of [5] and [8].
- (1.4.6) When the SG receives a SCON from an ASP and determines that a SP is encountering congestion, it shall trigger SS7 MTP3 TFC messages to concerned SS7 destinations according to the congestion procedures of [5] and [8]. The receiving node shall be able to detect local congestion and inform the transmitting node of this, by whatever means [9].
- (1.4.8) The required response times under association failure are outlined in [9].

### 4.3 M3UA Protocol Elements

- General It is recommended that the 'Info string' structure be ASCII text encoded (UK English).  
14 bit Point codes shall be used. The point code mask fields shall be set to 0.
- (3.4.4) Signalling Congestion (SCON),
  - Will not be sent when SS7 congestion level changes (*See reason 1*)The national option, without congestion priorities, is required [5].
- (3.4.5) DUPU, MTP3 User ID field  
The values here shall align with the MTP3 User Part Unavailable message and service indicator. Additional service indicator values may also be required. Refer to [6] and [7].

#### **4.4 Procedures**

- (4.1.1) M3UA shall use an algorithm that produces an even distribution for transmitting messages across associations. Refer to [9].
- (4.3.4.3) By bi-lateral agreement, an AS can consist of more than one ASP.

**END OF ND1012 §4**

**END OF ND1012**