

## **UK Interconnect use of SCTP**

---

NICC Standards Limited

Michael Faraday House,  
Six Hills Way,  
Stevenage  
SG1 2AY

Tel.: +44(0) 20 7036 3636

Registered in England and Wales under number 6613589

## NOTICE OF COPYRIGHT AND LIABILITY

© 2011 **NICC Standards Limited**

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be that printing on NICC printers of the PDF version kept on a specific network drive within the NICC.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other NICC documents is available at:

<http://www.niccstandards.org.uk/publications/>

If you find errors in the present document, please send your comments to:

<mailto:help@niccstandards.org.uk>

**Copyright**

All right, title and interest in this document are owned by NICC Standards Limited ("NICC") and/or the contributors to the document (unless otherwise indicated that copyright is owned or shared with a third party). Such title and interest is protected by United Kingdom copyright laws and international treaty provisions.

The contents of the document are believed to be accurate at the time of publishing, but no representation or warranty is given as to their accuracy, completeness or correctness. You may freely download, copy, store or distribute this document provided it is not modified in any way and it includes this copyright and liability statement.

You may not modify the contents of this document. You may produce a derived copyright work based on this document provided that you clearly indicate that it was created by yourself and that it was derived from this document and provided further that you ensure that any risk of confusion with this document is avoided.

**Liability**

Whilst every care has been taken in the preparation and publication of this document, neither NICC, nor any working group, committee, member, director, officer, agent, consultant or adviser of or to, or any person acting on behalf of NICC, nor any member of any such working group or committee, nor the companies, entities or organisations they represent, nor any other person contributing to the contents of this document (together the "Generators") accepts liability for any loss or damage whatsoever which may arise from the use of or reliance on the information contained in this document or from any errors or omissions, typographical or otherwise in the contents.

Nothing in this document constitutes advice. Nor does the transmission, downloading or sending of this document create any contractual relationship. In particular no licence is granted under any intellectual property right (including trade and service mark rights) save for the above licence to download copy, store and distribute this document and to produce derived copyright works.

The liability and responsibility for implementations based on this document rests with the implementer, and not with any of the Generators. If you implement any of the contents of this document, you agree to indemnify and hold harmless each Generator in any jurisdiction against any claims and legal proceedings alleging that the use of the contents by you or on your behalf infringes any legal or other right of any of the Generators or any third party.

None of the Generators accepts any liability whatsoever for any direct, indirect or consequential loss or damage arising in any way from any use of or reliance on the contents of this document for any purpose.

The NICC Standards Web site contains the definitive information on the [IPR Policy and Anti-trust Compliance Policy](#)

If you have any comments concerning the accuracy of the contents of this document, please write to:

The Technical Secretary, NICC Standards Ltd.,

Michael Faraday House,  
Six Hills Way,  
Stevenage  
SG1 2AY

---

# Contents

UK Interconnect use of SCTP .....	1
Intellectual Property Rights .....	4
Foreword .....	4
Introduction .....	4
1 Scope .....	5
2 References .....	5
2.1 Normative references .....	5
2.2 Informative references .....	6
3 Definitions, symbols and abbreviations .....	6
3.1 Definitions .....	6
3.2 Symbols .....	6
3.3 Abbreviations .....	7
4 Use of SCTP (normative): .....	8
4.1 Endorsement Notice .....	8
4.2 Exceptions to RFC4960 [2] .....	8
<b>Annex A (normative): SCTP requirements for SIP .....</b>	<b>12</b>
A.1 Exceptions to RFC4960 [2] .....	12
<b>Annex B (normative): SCTP requirements for SIP-I.....</b>	<b>13</b>
B.1 Exceptions to RFC4960 [2] .....	13
<b>Annex C (normative): SCTP requirements for M3UA .....</b>	<b>14</b>
C.1 Exceptions to RFC4960 [2] .....	14
<b>Annex D (normative): SCTP requirements for M2PA .....</b>	<b>15</b>
D.1 Exceptions to RFC4960 [2] .....	15
<b>Annex E (informative): SCTP general requirements.....</b>	<b>16</b>
E.1 Consequences of choosing either IPv4 or IPv6 address types .....	16
E.2 Guidelines on IP Security Choices .....	16
E.3 Guidelines on IP Address Assignment.....	16
E.4 Performance Requirements .....	16
History .....	17

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to NICC. Pursuant to the [NICC IPR Policy](#), no investigation, including IPR searches, has been carried out by NICC. No guarantee can be given as to the existence of other IPRs which are, or may be, or may become, essential to the present document.

---

## Foreword

This NICC Document (ND) has been produced by NICC Applications Protocols Working Group.

---

## Introduction

This document shall define the Stream Control Transmission Protocol (SCTP) requirements for UK interconnect use of IP. It is primarily intended for use in Orange release and beyond but may be used for Green and Purple release.

Note: In this first issue of this document there is no intention to change the technical requirements between Orange, Green and Purple release, however the latest RFCs will be mandated and as a consequence there may be, as yet unidentified, backward compatibility issues.

The information is intended for use by designers of signalling applications that require use of signalling transport protocols, as well as for use by network operators needing to engineer signalling transport networks and to configure signalling applications for UK national network interconnect.

This document will be revised as necessary and in accordance with the NICC workplan to include information appropriate to enhancements to the relevant signalling protocols.

---

---

# 1 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 UK Public networks.

This SCTP specification is appropriate to interconnect within the UK network for end node to end node configuration.

The present document specifies the SCTP requirements for UK interconnect when used as a transport for the following protocols and adaptation layers:

- SIP
- SIP-I
- M3UA
- M2PA

---

# 2 References

For the particular version of a document applicable to this release see [ND1610](#) [1].

## 2.1 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ND1610 Next Generation Networks; Release Definition
- [2] RFC4960 Stream Control Transmission Protocol
- [3] 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)
- [4] ND1613 NGN Interconnect: Transport Service Layer Management
- [5] ND1029 UK Interconnect use of M3UA
- [6] ND1026 NGN; MTP3 over IP Interconnect between PLMNs using M2PA Protocol
- [7] ND1017 Interworking between Session Initiation Protocol (SIP) and UK ISDN User Part (UK ISUP)
- [8] ND1019 IP Multimedia Call Control based on Session Initiated Protocol (SIP) and Session Description Protocol (SDP) for UK Interconnect
- [9] RFC5062 Security Attacks Found Against the Stream Control Transmission Protocol (SCTP) and Current Countermeasures
- [10] ND1628 Securing DATA flows with IPsec for NGN interconnects
- [11] ITU-T Q.706 Signalling System No.7, Message Transfer Part, Signalling Performance
- [12] ITU-T Q.716 Signalling System No.7, Signalling Connection Control Part (SCCP performance)
- [13] ITU-T Q.766 Performance objectives in the integrated services digital network application

## 2.2 Informative references

- [i.1] RFC3436 Transport Layer Security over Stream Control Transmission Protocol
- [i.2] ETSI TS 102 141 Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN; M2UA
- [i.3] ETSI TS 102 142 Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN; M3UA
- [i.4] ETSI TS 102 143 Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN; SUA
- [i.5] ND1612 Generic IP Connectivity for PSTN/ISDN Services between Next Generation Networks
- [i.6] ND1620 NGN; Voice Line Control Service; Interconnect Architecture
- [i.7] RFC4168 The Stream Control Transmission Protocol (SCTP) as a Transport for the Session Initiation Protocol (SIP)

---

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**Key words:** The key words '**SHALL**', '**SHALL NOT**', '**MUST**', '**MUST NOT**', '**SHOULD**', '**SHOULD NOT**', '**MAY**', '**NEED NOT**', '**CAN**' and '**CANNOT**' in this document are to be interpreted as defined in the ETSI Drafting Rules.

Any functionality outlined in RFC4960 [2] as '**SHOULD**' and '**MUST**' is to be considered as mandatory (**SHALL**). Any behaviour outlined as '**SHOULD NOT**' and '**MUST NOT**' is to be read as '**SHALL NOT**'.

**Not Required:** The ETSI specifications TS 102 144 [3] use the term '**NOT REQUIRED**'. For UK Interconnect use this term is defined as follows:

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.

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.

### 3.2 Symbols

For the purposes of the present document, the following symbols apply:

N/A

### 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AP	Application
BICC	Bearer Independent Call Control
CP	Communications Provider
DATA	Payload Data (SCTP chunk)
ECN	Explicit Congestion Notification
ETSI	European Telecommunications Standards Institute
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
INIT	Initiation (SCTP chunk)
INIT-ACK	Initiation Acknowledgement (SCTP chunk)
IP	Internet Protocol
IPsec	IP Security protocol
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
ISC	Interconnect Standards Committee (replaced by TSG WP)
ISDN	Integrated Services Digital Network
IPSP	IP Signalling Point
ISUP	Integrated Services User Part
ITU-T	International Telecommunications Union - Telecommunications Standardization Sector
M2PA	MTP2 User Peer-to-Peer Adaptation Layer
M3UA	MTP3 User Adaptation Layer
MTP	Message Transfer Part of ITU-T Signalling System Number 7
MTP2	MTP Level 2 protocol (Signalling Link)
MTP3	MTP Level 3 Protocol (Signalling Network)
MTU	Maximum Transmission Unit
NGN	Next Generation Network
NICC	Network Interoperability Consultative Committee
NTP	Network Termination Point
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
PLMN	Public Land Mobile Network
QoS	Quality of Service
RFC	Request for Comments
RTO	Retransmission Time-out
SACK	Selective Acknowledgement (SCTP chunk)
SCTP	Stream Control Transmission Protocol
SCCP	Signalling Connection Control Part
SDP	Session Description Protocol
SEP	Signalling End Point
SIP	Session Initiation Protocol
SIP-I	Session Initiation Protocol with encapsulated ISUP
SS7	Signalling System Number 7
SSCOP	Service Specific Connection Oriented Protocol
SMS	Short Message Service
SPAN	Services and Protocols for Advanced Networks
SGW	Signalling Gateway
TCP	Transmission Control Protocol
TDM	Time Division Multiplexing
TFC	Transfer controlled message
TLS	Transport Layer Security
TP	Transport
TSG	Technical Steering Group
UK	United Kingdom of Great Britain and Northern Ireland
VLC	Voice Line Control
WP	Working Party

Not all abbreviations will be used in this document.

## 4 Use of SCTP (normative):

### 4.1 Endorsement Notice

RFC4960 [2] is hereby endorsed subject to the exceptions in the present clause and applicable application annex.

### 4.2 Exceptions to RFC4960 [2]

RFC4960 Clause	Title	Change
1.5.3	<b>User Data Fragmentation</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“If the supported user data size (see clause 3) would result in DATA chunks larger than allowed by clause 6, the sending SCTP end-point <b>SHALL</b> support fragmentation of user data.</p> <p>However, if this is not the case the support of user data fragmentation on the sending side is <b>NOT REQUIRED</b>. This is the case for TS 102 141 [i.2] and TS 102 142 [i.3] when not used in combination with RFC 3436 [i.1].</p> <p>The reception of fragmented user data <b>SHALL</b> be supported.”</p>
3.	<b>SCTP Packet Format</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“An SCTP end-point <b>SHALL</b> support the sending and reception of user data with the maximum size defined by the upper layer.</p> <p>An SCTP end-point is <b>NOT REQUIRED</b> to support the handling of larger user data sizes. If transport layer security is used the user data size which has to be supported is 18,437, see RFC 3436 [i.1] for more information.”</p>
3.3.2.1	<b>Optional/Variable-Length Parameters in INIT</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“An SCTP end-point <b>SHALL</b> support IPv4 address parameters, <b>MAY</b> support IPv6 address parameters and <b>SHALL NOT</b> support the hostname address parameter. The sender of an INIT-chunk <b>SHALL</b> include the Supported Address parameter indicating the support of IPv4 and optionally IPv6. Support for Hostname addresses <b>SHALL NOT</b> be indicated. If a hostname address parameter is included in an INIT or INIT-ACK chunk, the receiver <b>SHALL</b> reply with an ABORT chunk using the error cause ‘Un-resolvable Address’.</p> <p>Single-homed SCTP end-points <b>SHALL NOT</b> include an address parameter in INIT and INIT-ACK chunks.”</p>
5.1.1	<b>Handle Stream Parameters</b>	<p>The minimum incoming and outgoing streams required is application dependant and is contained within the appropriate annex of this document.</p> <p>Insert the following paragraphs at the end of clause:</p> <p>“The number of streams to be supported at start up time by the association <b>SHALL</b> be the minimum requested (INIT chunk) and offered (INIT-ACK chunk) by the two endpoints.</p> <p>The number of outbound and inbound streams <b>SHALL</b> be the same in both directions. The method of allocating calls to streams is implementation dependant.</p> <p>If the peer endpoint supports only 1 incoming stream, or outgoing stream the endpoint <b>SHALL</b> abort the association and <b>MAY</b> 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 4960 [2].“</p>



RFC4960 Clause	Title	Change
6.	<b>User Data Transfer</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“IP-packets containing SCTP packets <b>SHALL NOT</b> be larger than the Path MTU.</p> <p>An SCTP end-point <b>SHALL</b> use INIT and INIT-ACK chunks such that the resulting IP-packet is not larger than the Path MTU. This limits the number of paths used by SCTP associations. DATA chunks <b>SHALL NOT</b> exceed a size that would result in IP-packets larger than the path MTU. The size of HEARTBEAT chunks <b>SHALL</b> be equivalent to the size of DATA chunks.”</p>
6.4	<b>Multi-Homed SCTP Endpoints</b>	<p>Support for multi-homed SCTP endpoints is application dependant and is contained within the appropriate annex of this document.</p> <p>Insert the following paragraphs at the end of clause:</p> <p>“The chosen number of IP addresses for a given association <b>SHOULD</b> be a number that is supported by the implementations at each end of that association.</p> <p>A node <b>SHOULD</b> make use of multiple IP addresses if known for multi-homing. Whether this is done within the SCTP or is initiated by the SCTP’s user is implementation dependent.</p> <p>If association initialization to an IP destination address is unsuccessful, and alternative destination IP addresses are known, the sending node <b>SHALL</b> reattempt initialization by the sending the INIT chunk to the alternative IP address.”</p>
6.6	<b>Ordered and Unordered Delivery</b>	<p>Support for unordered delivery at the sending SCTP endpoint is application dependant and is contained within the appropriate annex of this document.</p> <p>Insert the following paragraphs at the end of clause:</p> <p>“The receiving SCTP end-point <b>SHALL</b> support the reception of DATA chunks marked for unordered delivery and ordered delivery.</p> <p>Note: TS 102 141 [i.2], TS 102 142 [i.3] and TS 102 143 [i.4] do not make use of unordered delivery and RFC 3436 [i.1] does not support it.”</p>
6.10	<b>Bundling</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“An SCTP end-point <b>SHALL</b> allow disabling of that DATA-chunk bundling which introduces additional delay.</p> <p>This <b>SHALL NOT</b> affect bundling which introduces no additional delays.”</p>
7.3	<b>Path MTU Discovery</b>	<p>Replace the clause with the following paragraph:</p> <p>“Path MTU discovery is <b>NOT REQUIRED</b>.</p> <p>The endpoint <b>SHALL</b> allow the MTU size for each path to be manually configured, within the range specified in Table 1.”</p>
8.3	<b>Path Heartbeat</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“SCTP end-points <b>SHALL</b> support the heartbeat mechanism and the sending of HEARTBEAT chunks on idle paths <b>SHALL</b> be enabled by default.”</p>

RFC4960 Clause	Title	Change
15.	<b>Suggested SCTP Protocol Parameter Values</b>	<p>The default SCTP parameters defined in RFC 4960 [2] are intended to allow SCTP to co-exist seamlessly with TCP in the Internet. These values are considered to be unsuitable to meet the performance requirements of SS7 user parts and VLC applications (defined in ND1612 [i.5] and ND1620 [i.6]), especially during failure, congestion and packet loss situations. Hence they are not suitable for UK interconnect purposes.</p> <p>Replace the clause with the following paragraphs including Table 1:</p> <p>“For optimal performance appropriate values within the configurable range, defined in Table 1, <b>SHALL</b> be agreed by interconnecting parties; if such agreement can not be reached then the default values in Table 1 <b>SHALL</b> be used.</p> <p>Note: The application <b>MAY</b> require different defaults, in that case, please refer to the appropriate annex.”</p>

RFC4960 Clause	Title	Change																																																																																
<b>Table 1: SCTP parameter values</b>																																																																																		
<table border="1"> <thead> <tr> <th data-bbox="236 331 557 416">Parameter</th> <th data-bbox="557 331 740 416">Minimum value</th> <th data-bbox="740 331 924 416">Maximum value</th> <th data-bbox="924 331 1257 416">Default value</th> <th data-bbox="1257 331 1439 416">Granularity</th> </tr> </thead> <tbody> <tr> <td>RTO.Min</td> <td>10 ms</td> <td>5 s</td> <td>40 ms</td> <td>10 ms</td> </tr> <tr> <td>RTO.Max</td> <td>200 ms</td> <td>120 s</td> <td>200 ms</td> <td>10 ms</td> </tr> <tr> <td>RTO.Initial</td> <td>RTO.Min</td> <td>RTO.Max</td> <td>100 ms</td> <td>10 ms</td> </tr> <tr> <td>RTO.Alpha</td> <td>1/8</td> <td>1/8</td> <td>1/8</td> <td></td> </tr> <tr> <td>RTO.Beta</td> <td>1/4</td> <td>1/4</td> <td>1/4</td> <td></td> </tr> <tr> <td>Valid.Cookie.Life</td> <td>5 s</td> <td>120 s</td> <td>60 s</td> <td>1 s</td> </tr> <tr> <td>HB.Interval</td> <td>1 s</td> <td>300 s</td> <td>3 s</td> <td>1 s</td> </tr> <tr> <td>SACK period</td> <td>0 ms</td> <td>500 ms</td> <td>0 ms (note 1)</td> <td>10 ms</td> </tr> <tr> <td>SACK frequency</td> <td>1</td> <td>5</td> <td>1 (note 2)</td> <td>1</td> </tr> <tr> <td>MTU size (per path)</td> <td>508 bytes</td> <td>65535 bytes</td> <td>1438 bytes (note 3)</td> <td>1 byte</td> </tr> <tr> <td>Max.Init.Retransmits</td> <td></td> <td></td> <td>8</td> <td>1</td> </tr> <tr> <td>Association.Max.Retrans</td> <td>6</td> <td>10</td> <td>10 (note 4)</td> <td>1</td> </tr> <tr> <td>Path.Max.Retrans</td> <td>3</td> <td>8</td> <td>8 per destination address</td> <td>1</td> </tr> <tr> <td>Max.Burst</td> <td></td> <td></td> <td>4 (note 5)</td> <td>1</td> </tr> <tr> <td>HB.Max.Burst</td> <td></td> <td></td> <td>1 (note 5)</td> <td>1</td> </tr> </tbody> </table>			Parameter	Minimum value	Maximum value	Default value	Granularity	RTO.Min	10 ms	5 s	40 ms	10 ms	RTO.Max	200 ms	120 s	200 ms	10 ms	RTO.Initial	RTO.Min	RTO.Max	100 ms	10 ms	RTO.Alpha	1/8	1/8	1/8		RTO.Beta	1/4	1/4	1/4		Valid.Cookie.Life	5 s	120 s	60 s	1 s	HB.Interval	1 s	300 s	3 s	1 s	SACK period	0 ms	500 ms	0 ms (note 1)	10 ms	SACK frequency	1	5	1 (note 2)	1	MTU size (per path)	508 bytes	65535 bytes	1438 bytes (note 3)	1 byte	Max.Init.Retransmits			8	1	Association.Max.Retrans	6	10	10 (note 4)	1	Path.Max.Retrans	3	8	8 per destination address	1	Max.Burst			4 (note 5)	1	HB.Max.Burst			1 (note 5)	1
Parameter	Minimum value	Maximum value	Default value	Granularity																																																																														
RTO.Min	10 ms	5 s	40 ms	10 ms																																																																														
RTO.Max	200 ms	120 s	200 ms	10 ms																																																																														
RTO.Initial	RTO.Min	RTO.Max	100 ms	10 ms																																																																														
RTO.Alpha	1/8	1/8	1/8																																																																															
RTO.Beta	1/4	1/4	1/4																																																																															
Valid.Cookie.Life	5 s	120 s	60 s	1 s																																																																														
HB.Interval	1 s	300 s	3 s	1 s																																																																														
SACK period	0 ms	500 ms	0 ms (note 1)	10 ms																																																																														
SACK frequency	1	5	1 (note 2)	1																																																																														
MTU size (per path)	508 bytes	65535 bytes	1438 bytes (note 3)	1 byte																																																																														
Max.Init.Retransmits			8	1																																																																														
Association.Max.Retrans	6	10	10 (note 4)	1																																																																														
Path.Max.Retrans	3	8	8 per destination address	1																																																																														
Max.Burst			4 (note 5)	1																																																																														
HB.Max.Burst			1 (note 5)	1																																																																														
<p>Note 1: The SACK period defines the maximum delay for generating an acknowledgement after receipt of a packet containing a DATA chunk (i.e. artificial delay <b>SHALL NOT</b> be added).</p> <p>Note 2: The SACK frequency defines how often a SACK is generated for every <i>n</i> packets received containing one or more DATA chunks within the SACK period.</p> <p>Note 3: This is the maximum size of each packet in any transmission, including the IP header and payload, specified in octets. It is the value to be used for the Path MTU referred to in RFC4960 [2]. The value ensures that should the packet later be encapsulated using IPsec using the encryption and authentication options specified in ND1613 [4], then the resultant packet size would be less than or equal to 1500 octets and would therefore not require IP fragmentation when carried over Ethernet.</p> <p>Note 4: The Association.Max.Retrans default value <b>SHALL</b> be greater than the Path.Max.Retrans default value.</p> <p>Note 5: Max.Burst and HB.Max.Burst is <b>NOT REQUIRED</b>.</p>																																																																																		
Appendix A	<b>Explicit Congestion Notification</b>	Replace the clause with the following sentence: "The support of ECN is <b>NOT REQUIRED</b> ."																																																																																

End of Clause 4

## Annex A (normative): SCTP requirements for SIP

### A.1 Exceptions to RFC4960 [2]

These requirements are in addition to clause 4 of this document and are only applicable to SIP, as defined by ND1019 [8].

RFC4960 Clause	Title	Change
5.1.1	<b>Handle Stream Parameters</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“A minimum of 16 outgoing and 16 incoming streams <b>SHALL</b> be supported.</p> <p>The receiving SCTP endpoint <b>SHALL</b> support the reception of data packets on stream 0. There are no management specific messages allocated to stream 0 for this application, therefore, the CP <b>MAY</b> choose to use stream 0 for outbound data packets.”</p>
6.4	<b>Multi-Homed SCTP Endpoints</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“For the UK the choice of single or dual-homed associations is dependant upon the resilience requirements and the product being supported e.g. PSTN/ISDN IP Interconnect or VLC.”</p>
6.6	<b>Ordered and Unordered Delivery</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“Support for <b>unordered</b> delivery at the sending SCTP end-point <b>SHALL</b> be the default action. Where the application requires an ordered delivery service the application specification <b>MAY</b> overrule this requirement.”</p>
14.4	<b>Payload Protocol Identifiers</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“There is no standardised SCTP Payload Protocol Identifier for SIP registered with IANA. The value 0 <b>SHALL</b> be used.</p> <p>Note: This is in agreement with RFC 4168 [i.7].”</p>

End of Annex A

## Annex B (normative): SCTP requirements for SIP-I

### B.1 Exceptions to RFC4960 [2]

These requirements are in addition to clause 4 of this document and are only applicable to SIP-I, as defined by ND1017 [7].

RFC4960 Clause	Title	Change
5.1.1	<b>Handle Stream Parameters</b>	<p>Insert the following paragraphs at the end of clause:</p> <p>“A minimum of 16 outgoing and 16 incoming streams <b>SHALL</b> be supported.</p> <p>The receiving SCTP endpoint <b>SHALL</b> support the reception of data packets on stream 0. There are no management specific messages allocated to stream 0 for this application, therefore, the CP <b>MAY</b> choose to use stream 0 for outbound data packets.”</p>
6.4	<b>Multi-Homed SCTP Endpoints</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“For the UK the choice of single or dual-homed associations is dependant upon the resilience requirements and the product being supported e.g. PSTN/ISDN IP Interconnect or VLC.”</p>
6.6	<b>Ordered and Unordered Delivery</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“Support for <b>ordered</b> delivery at the sending SCTP end-point <b>SHALL</b> be the default action.”</p>
14.4	<b>Payload Protocol Identifiers</b>	<p>Insert the following paragraph at the end of clause:</p> <p>“There is no standardised SCTP Payload Protocol Identifier for SIP-I registered with IANA. The value 0 <b>SHALL</b> be used.</p> <p>Note: This is in agreement with RFC 4168 [i.7].”</p>

End of Annex B

---

## Annex C (normative): SCTP requirements for M3UA

### C.1 Exceptions to RFC4960 [2]

These requirements are in addition to clause 4 of this document and are only applicable to M3UA, as defined by ND1029 [5].

RFC4960 Clause	Title	Change
5.1.1	<b>Handle Stream Parameters</b>	Insert the following paragraph at the end of clause: "A minimum of 2 incoming and 2 outgoing streams <b>SHALL</b> be supported."
6.4	<b>Multi-Homed SCTP Endpoints</b>	Insert the following paragraph at the end of clause: "An SCTP end-point <b>SHALL</b> support 2 or more paths towards its peer. "
6.6	<b>Ordered and Unordered Delivery</b>	Insert the following paragraph at the end of clause: "Support for unordered delivery at the sending SCTP-end-point is <b>NOT REQUIRED</b> . "

End of Annex C

## Annex D (normative): SCTP requirements for M2PA

### D.1 Exceptions to RFC4960 [2]

These requirements are in addition to clause 4 of this document and are only applicable to M2PA, as defined by ND1026 [6].

RFC4960 Clause	Title	Change										
5.1.1	<b>Handle Stream Parameters</b>	Insert the following paragraph at the end of clause: "A minimum of 2 incoming and 2 outgoing streams <b>SHALL</b> be supported."										
6.4	<b>Multi-Homed SCTP Endpoints</b>	Insert the following paragraph at the end of clause: "An SCTP end-point <b>SHALL</b> support 2 or more paths towards its peer."										
6.6	<b>Ordered and Unordered Delivery</b>	Insert the following paragraph at the end of clause: "Support for unordered delivery at the sending SCTP-end-point is <b>NOT REQUIRED.</b> "										
15.	<b>Suggested SCTP Protocol Parameter Values</b>	<p>Replace the default parameter values in Table 1, in the present document, with the default values shown below:</p> <p style="text-align: center;"><b>SCTP parameter defaults</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Parameter</th> <th>Default value</th> </tr> </thead> <tbody> <tr> <td>RTO.Min</td> <td>100 ms</td> </tr> <tr> <td>RTO.Max</td> <td>200 ms</td> </tr> <tr> <td>Association.Max.Retrans</td> <td>8</td> </tr> <tr> <td>Path.Max.Retrans</td> <td>4 per destination address</td> </tr> </tbody> </table>	Parameter	Default value	RTO.Min	100 ms	RTO.Max	200 ms	Association.Max.Retrans	8	Path.Max.Retrans	4 per destination address
Parameter	Default value											
RTO.Min	100 ms											
RTO.Max	200 ms											
Association.Max.Retrans	8											
Path.Max.Retrans	4 per destination address											

End of Annex D

---

## Annex E (informative): SCTP general requirements

### E.1 Consequences of choosing either IPv4 or IPv6 address types

The 'INIT' and 'INIT-ACK' chunk sizes are large enough to accommodate multiple IP addresses, however they do have a finite size, so if the number of IP addresses configured is large, then it is important to check that they do not exceed the chunk size. IPv6 addresses, being larger than IPv4 addresses, will reach the limit sooner.

### E.2 Guidelines on IP Security Choices

The security considerations listed in RFC4960 [2] and RFC5062 [9] **SHOULD** be taken into account for UK interconnect.

The security for the underlying IP network will be provided by all of the following techniques:

- Physical access control
- IPsec - see ND1628 [10]

The standardisation of security measures is outside the scope of this document.

### E.3 Guidelines on IP Address Assignment

Only selected combinations of IP addresses and Port identities **SHOULD** be allowed.

### E.4 Performance Requirements

Performance requirements are outside the scope of this document. However, for SCTP Adaptation Layer protocols the network implementation should take into account the performance requirements as outlined in Q.706 [11], Q.716 [12] and Q.766 [13].

End of Annex E



---

## History

<b>Document history</b>		
V1.1.1	March 2011	NICC/TSG approved version

End of Document