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Abstract

This Internet-Draft describes ASP Extensions (ASPEXT) for Signalling User Adaptation Protocols [IUA...TUA], which permits cooperating Signalling Peer Processes (SPPs) to indicate to each other the specific protocol extensions that each supports.

1. Introduction

1.1. Scope

This Internet-Draft provides parameters and procedures in extension to the parameters and procedures of the Signalling User Adaptation Layers (UAs) [IUA...TUA], for the purpose of supporting a framework for extending the parameters and procedures of these Adaptation Layers.

UA implementations with ASPEXT are intended to be compatible with UA implementations not supporting this configuration.

1.2. Change History

Changes from Version 0.0 to Version 1.0:

- added this history section,
- updated references,
- updated version numbers and dates,
- updated postscript diagrams,
- updated author’s address.

1.3. Terminology

ASPEXT adds the following terms to the terminology presented in the UA documents:

ASP Extension (ASPEXT) – An extension to one or more of the the UAs that requires identification of the capabilities of the SPP to support the extension as part of its requirements.
Signalling Peer Process (SPP) – refers to an ASP, SGP or IPSP.


1.4. Overview

There is a need to provide extensions for the Signalling User Adaptation Layer protocols that require interworking between Signalling Peer Processes (SPPs) implementing a specific extension and SPPs not implementing the extension.

ASPEXT provides parameters and procedures that allow Signalling Peer Processes (SPPs) implementing a given set of extensions to indicate its support to other SPPs as well as to discover the support for extensions provided by peer SPPs.

1.4.1. Existing Extension Management

The existing UA procedures[2] make no provisions for the management of extensions. Any mechanism that an SPP might use to determine the extension support of peer SPPs depends upon implementation dependent configuration information or protocols between SPPs.

For example, if an ASP implements and extension that requires that the ASP have knowledge of whether a peer SGP supports the extension, the ASP would have to be configured with this SGP-specific information, or would need to use some implementation-dependent mechanism to determine this information.

The lack of an IETF procedure for managing extension support represents a deficiency of the existing UA procedures[2] that detracts from interoperability between separate implementations of SPP peers.

1.4.2. ASP Extension Management

ASPEXT provide support for the following:

- Support for an SPP indicating to peer SPPs the extensions that are supported.
- Support for an SPP discovering what extensions are supported by peer SPPs.
- Support for an SPP supporting ASPEXT interworking with an SPP that does not support ASPEXT.

2. Conventions

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, NOT RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in [RFC 2119].

3. Protocol Elements

ASPEXT provides the following parameters and the messages in which they are included in addition to the parameters of the UAs.[3]

3.1. Parameters

ASPEXT provides the following parameters in addition to the parameters defined for the UAs.[3]

3.1.1. ASP Extensions

The ASP Extensions parameter is a common parameter used in the ASPUP and ASPUP ACK messages to identify the extension capabilities of the ASP (ASPUP) and the extension capabilities of the SGP or IPSP (ASPUP ACK).

The ASP Extensions parameter is formatted as follows:
The ASP Extensions parameter contains one or more of the following fields:

**ASP Extension field: 32-bits (unsigned integer)**

The ASP Extension field contains an IANA registered extension identifier number that identifies the extension supported by the ASP in an ASPUP or an extension supported by the SGP or IPSP in an ASPUP ACK. Examples of valid values for the ASP Extension field are as follows:

```
0  None
1  Protocol Limits Extension [SGINFO]
2  Load Selection Extension [LOADSEL]
3  Load Grouping Extension [LOADGRP]
4  Correlation Id and Heartbeat Extension [CORID]
5  Registration Extension [REGEXT]
6  Session Identification Extension [SESSID]
− (All other values are IETF reserved.)
```

Each occurrence of an ASP Extension field indicates that the sending SPP supports the specified extension. The ASP Extension parameter **MUST** contain at least one ASP Extension value. An ASP Extension field containing the value "None" **MUST** be the only ASP Extension field included in the ASP Extension parameter.

### 3.2. Messages

**ASPEXT** extends the following messages defined for the UAs.[3]

#### 3.2.1. ASP Up (ASPUP)

ASPEXT supplements the ASPUP message by permitting the following optional parameters to be included in the message:

<table>
<thead>
<tr>
<th>Extension Parameters</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASP Extensions</td>
<td></td>
</tr>
</tbody>
</table>

The format of the resulting ASPUP message is as follows:
To indicate its support for a specific extension, the ASP MUST include the specific extension number in the ASP Extensions parameter in the ASPUP message.

No other changes to the ASPUP message format are provided by this extension.

3.2.2. ASP Up Acknowledgment (ASPUP ACK)

ASPEXT supplements the ASPUP ACK message by permitting the following optional parameters to be included in the message:

<table>
<thead>
<tr>
<th>Extension Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASP Extensions</td>
</tr>
</tbody>
</table>

The format of the resulting ASPUP ACK message is as follows:

```plaintext
0123456789012345678901
+----------------------------------+
| Tag = 0xXXXX | Length |
| ASP Extensions |
| Tag = 0x0004 | Length |
| Info String |
```

EDITOR’S NOTE:– The parameter tag values shown as 0xXXXX above will be assigned by IANA within the common parameter range of the SIGTRAN UAs and may change its value in further versions of this document.

To indicate its support for a specific extension, SGP and IPSP MUST include the specific extension number in the ASP Extensions parameter in the ASPUP ACK message.

No other changes to the ASPUP ACK message format are provided by this extension.

4. Procedures

The following procedures are provided in extension to the UA procedures by ASPEXT.

4.1. ASP Management Procedures
4.1.1. ASP Up Procedures

In extension of the "ASP Up Procedures" of the UAs[2], ASPEXT provides the following procedures:

Whenever an ASP, as part of the normal UA procedures, sends an ASP Up (ASPUP) message to an SGP or IPSP it MAY include the ASP Extensions parameter indicating the extensions supported by the ASP.

Upon receiving an ASP Up (ASPUP) message from an ASP that contains the ASP Extensions parameter, an SGP or IPSP supporting ASPEXT MUST register the ASP’s support of the specified extensions and MUST place an ASP Extensions parameter of its own in the responding ASP Up Acknowledgment (ASPUP ACK) indicating which of the extensions provided in the ASPUP are supported.

If an SGP or IPSP supporting ASPEXT receives an ASPUP message that does not contain an ASP Extensions parameter, the SGP or IPSP MAY assume that the ASP does not support any extensions, or MAY rely on internal configuration data to determine the extensions supported by the ASP. The SGP or IPSP SHOULD NOT include the ASP Extensions parameter in the responding ASPUP ACK message.

Upon receiving an ASP Up Acknowledgment (ASPUP ACK) containing an ASP Extensions parameter, an ASP supporting ASPEXT MUST register the SGP or IPSP’s support of the specified extensions.

If an SPP supporting ASPEXT receives an ERR message indicating the ASP Extensions parameter as an "Invalid Parameter" in response to an ASPUP or ASPUP ACK message, the SPP SHOULD re-attempt sending the ASPUP or ASPUP ACK message without the ASP Extensions parameter.

4.1.2. ASP Down Procedures

In extension to the "ASP Down Procedure" of the UAs[2], ASPEXT provides the following procedures:

Whenever an ASP, as part of the normal UA procedures, sends an ASP Down (ASPDN) message to an SGP or IPSP, the ASP supporting ASPEXT SHOULD clear any ASP Extensions previously registered while the ASP was in the ASP-UP state for the SGP.

Upon sending an ASP Down Acknowledgment (ASPDN ACK), either in response to an ASPDN or unsolicited, an SGP supporting ASPEXT SHOULD clear any ASP Extensions previously registered while the ASP was in the ASP-UP state at the SGP.

5. Examples

5.1. Both ASP and SGP/IPSP support ASP Extensions

Figure 1 illustrates an example where both the ASP and the SGP or IPSP support ASPEXT.

![Figure 1](image)

Figure 1. Both ASP and SGP/IPSP support ASP Extensions

The example sequence of events for the example illustrated in Figure 1 is as follows:

1. An SCTP Association is established or the ASP is otherwise in the ASP-DOWN state.
2. The ASP sends an ASPUP message to the SGP or IPSP containing an ASP Extensions parameter identifying (for example) two extensions: Load Selection [LOADSEL] and Correlation Id/Heartbeat [CORID]; indicating the ASP’s support for these two extensions requiring interworking support.
3. The SGP or IPSP responds with an ASPUP ACK message containing an ASP Extensions parameter identifying (for example) support for only one extension: Load Selection [LOADSEL].
4. The ASP and SGP/IPSP register the peer’s support (or lack of support) for the LOADSEL and CORID extensions and modify subsequent procedures accordingly.
5.2. Interworking Examples

5.2.1. ASP supports ASP Extensions, SGP/IPSP does not

*Figure 2 and 3 illustrate an example where the ASP supports ASPEXT but the SGP or IPSP does not.*

![Diagram of ASP supports ASP Extensions, SGP/IPSP ignores](image1)

*Figure 2. ASP supports ASP Extensions, SGP/IPSP ignores*

The example sequence of events for the example illustrated in *Figure 2* is as follows:

1. An SCTP Association is established or the ASP is otherwise in the ASP-DOWN state.
2. The ASP sends an *ASPUP* message to the SGP or IPSP containing an *ASP Extensions* parameter identifying (for example) two extensions: Load Selection [LOADSEL] and Correlation Id/Heartbeat [CORID]; indicating the ASP’s support for these two extensions requiring interworking support.
3. The SGP or IPSP ignores the *ASP Extensions* parameter in the *ASPUP* and responds with an *ASPUP ACK* message containing no *ASP Extensions* parameter.
4. The ASP either assumes that the SGP or IPSP does not support the LOADSEL or CORID extensions, or relies upon configuration data to indicate the SGP or IPSP’s support for these extensions. The ASP modifies its subsequent procedures with regard to the extension accordingly.

![Diagram of ASP supports ASP Extensions, SGP/IPSP refuses](image2)

*Figure 3. ASP supports ASP Extensions, SGP/IPSP refuses*

The example sequence of events for the example illustrated in *Figure 3* is as follows:

1. An SCTP Association is established or the ASP is otherwise in the ASP-DOWN state.
2. The ASP sends an *ASPUP* message to the SGP or IPSP containing an *ASP Extensions* parameter identifying (for example) two extensions: Load Selection [LOADSEL] and Correlation Id/Heartbeat [CORID]; indicating the ASP’s support for these two extensions requiring interworking support.
3. The SGP or IPSP refuses to accept the *ASP Extensions* parameter in the *ASPUP* message and responds with an *ERR* ("Invalid Parameter") message indicating such.
4. The ASP re-attempts by sending an *ASPUP* message without an *ASP Extensions* parameter.
5. The SGP or IPSP responds with an *ASPUP ACK* message containing no *ASP Extensions* parameter.
The ASP either assumes that the SGP or IPSP does not support the LOADSEL or CORID extensions, or relies upon configuration data to indicate the SGP or IPSP’s support for these extensions. The ASP modifies its subsequent procedures with regard to the extension accordingly.

5.2.2. SGP/IPSP supports ASP Extensions, ASP does not

Figure 4 illustrates an example where the SGP or IPSP supports ASPEXT but the ASP does not.

![Figure 4. SGP/IPSP supports ASP Extensions, ASP ignores](image)

The example sequence of events for the example illustrated in Figure 4 is as follows:

1. An SCTP Association is established or the ASP is otherwise in the ASP-DOWN state.
2. The ASP sends an ASPUP message to the SGP or IPSP not containing an ASP Extensions parameter.
3. The SGP or IPSP responds with an ASPUP ACK message not containing an ASP Extensions parameter.
4. The SGP either assumes that the ASP does not support the CORID extensions, or relies upon configuration data to indicate the ASP’s support for these extensions. The SGP modifies its subsequent procedures with regard to the extension accordingly.

6. Security

ASPEXT does not introduce any new security risks or considerations that are not already inherent in the UA [IUA...TUA]. Please see the "Security" sections of IUA [IUA], DUA [DUA], V5UA [V5UA], GR303UA [GR303UA], M2UA [M2UA], M3UA [M3UA], SUA [SUA], ISUA [ISUA] and TUA [TUA], for security considerations and recommendations that are applicable to each of these UAs.

It is possible that an attacker or malicious endpoint might manipulate the ASP Extensions parameter in an attempt to cause denial of service attacks on either an SGP or ASP. However, because each extension has a fall back procedure which provides for interworking without the ASPEXT capability, ASPEXT introduces no further threat if the endpoint adheres to the following rule:

Although an endpoint has registered an ASP extension against a peer endpoint, the registering endpoint SHOULD take this information as advisory and continue to effect interworking and fullback procedures in the event that the information in the ASP Extensions parameter is malicious, in error, or invalid.

7. IANA Considerations

7.1. Extensions

ASPEXT provides an additional ASP Extensions message parameter to the common parameter range of the SIGTRAN UAs [IUA...TUA]:

(a) The parameter is named the ASP Extensions parameter.
(b) The structure of the ASP Extensions parameter field conforms to the UA general TLV format and is described in detail in Section 3.1.1.
(c) The detailed definition of each component of the ASP Extensions parameter values is described in Section 3.1.1.
(d) This document also provides a detailed description of the intended use of the ASP Extensions parameter, and in which messages the ASP Extensions parameter should appear, how many times, and when.

EDITOR’S NOTE:– The ASP Extensions parameter tag value shown throughout this document as 0xXXXX will be assigned by IANA within the common parameter range of the SIGTRAN UAs and may change its value in further versions of this document.
7.2. Protocol Extensions

UA protocols may be extended through IANA in three ways:

- through definition of additional message classes;
- through definition of additional message types; and,
- through definition of additional message parameters.

The definition and used of new message classes, types and parameters is an integral part of the SIGTRAN adaptation layers. Thus, these extensions are assigned by IANA through an IETF Consensus action [RFC 2434].

The proposed extension MUST in no way adversely affect the general working of the protocol.

To permit interoperability of implementations supporting a particular extension with implementation not supporting that extension, a UA Extension number can be assigned to a protocol extension in accordance with this document. A new registry will be created by IANA to allow:

7.2.1. IETF Defined UA Protocol Extension

In addition to the documentation required for each message class, message type and message parameter extension, the documentation of the UA Protocol Extension number MUST include the following information:

(a) A long and short name for the Extension.
(b) A detailed description of the the purpose of the Extension.
(c) A detailed description of the Message Classes, Types and Parameters provided by the extension.
(d) A detailed description of the interworking between UA implementations supporting the Extension and UA implementations not supporting the Extension.

Notes

[1] Currently all SS7 Signalling User Adaptation Layers support ASP Management with the exception of M2PA [M2PA06].

[2] See, for example, Section 4 of the specific UA document [M3UA...TUA].

[3] See, for example, Section 3 of the specific UA document [M3UA...TUA].

References


V5UA. E. Weilandt, N. Khanchandani and S. Rao, “V5.2-User Adaption Layer (V5UA),” <draft-ietf-sigtran-v5ua-03.txt>, Internet Engineering Task Force - Signalling Transport Working Group (June 2002). Work In Progress. [Informative]

GR303UA.


RFC 2960.

M2PA06.

RFC 2119.

SGINFO.

LOADSEL.

LOADGRP.

CORID.

REGEVT.

SESSID.

RFC 2434.
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