CESG POLL ITEM DISPOSITION (PID) INITIATION FORM

AREA PID NUMBER: 01

SUBMITTING AREA: Space Internetworking Services (SIS)

------------------------------------------------------------------

REVIEWER'S NAME: Keith Scott

E-MAIL ADDRESS: kscott@mitre.org

------------------------------------------------------------------

DOCUMENT NUMBER: CCSDS 130.0-G-2.1 Proposed Green Book, Issue 2.1

DOCUMENT NAME: OVERVIEW OF SPACE COMMUNICATIONS PROTOCOLS

DATE ISSUED: March 2014

PAGE NUMBER: 2-7 PARAGRAPH NUMBER: 2.2.4

PID SHORT TITLE: CFDP Transport-Layer Service I

------------------------------------------------------------------

DESCRIPTION OF REQUESTED CHANGE: (Use From: "..." To "..." format)

From [**Note: Light blue highlight marks proposed text for deletion**.]:

2.2.5 TRANSPORT LAYER

Space communications protocols of the Transport Layer provide users with end-to-end transport services.

CCSDS has developed the SCPS Transport Protocol (SCPS-TP) (reference [13]) for the Transport Layer. The CCSDS File Delivery Protocol (CFDP) (reference [15]) also provides the functionality of the Transport Layer, but it provides some functions (i.e., functions for file management) of the Application Layer as well.

PDUs of a Transport Layer protocol are usually transferred with a protocol of the Network Layer over a space link, but they can be transferred directly by a Space Data Link Protocol if certain conditions are met.

Transport protocols used in the Internet (such as TCP, reference [24], and UDP, reference [25]) can also be used on top of IP datagrams over CCSDS space links, reference [45]. IPSec (reference [27]) may be used with a Transport protocol of the Internet suite to provide end-to-end data protection capability.

2.2.6 APPLICATION LAYER

Space communications protocols of the Application Layer provide users with end-to-end application services such as file transfer and data compression.

CCSDS has developed five protocols for the Application Layer:

a) Asynchronous Messaging Service (AMS) (reference [46]);

b) CCSDS File Delivery Protocol (CFDP) (reference [15]);

c) Lossless Data Compression (reference [16]);

d) Image Data Compression (reference [17]);

e) Lossless Multispectral & Hyperspectral Image Compression (reference [48]);

AMS is an application layer service for mission data system communications.

CFDP provides the functionality of the Application Layer (i.e., functions for file management), but it also provides functions of the Transport Layer.

Each project (or Agency) may elect to use application-specific protocols not recommended by CCSDS to fulfill their mission requirements in the Application Layer over CCSDS space communications protocols.

PDUs of an Application Layer protocol (excluding CFDP) are usually transferred with a protocol of the Transport Layer over a space link, but they can be transferred directly with a protocol of the Network Layer if certain conditions are met.

Applications protocols used in the Internet (such as FTP, reference [26]) can also be used on top of SCPS-TP, TCP and UDP over space links.

To [**Note: Yellow highlight marks proposed text for addition and/or modification.**]:

**2.2.5 TRANSPORT LAYER**

Space communications protocols of the Transport Layer provide users with end-to-end transport services.

CCSDS has developed the SCPS Transport Protocol (SCPS-TP) (reference [13]) for the Transport Layer.

PDUs of a Transport Layer protocol are usually transferred with a protocol of the Network Layer over a space link, but they can be transferred directly by a Space Data Link Protocol if certain conditions are met.

Transport protocols used in the Internet (such as TCP, reference [24], and UDP, reference [25]) can also be used on top of IP datagrams over CCSDS space links, reference [45]. IPSec (reference [27]) may be used with a Transport protocol of the Internet suite to provide end-to-end data protection capability.

**2.2.6 APPLICATION LAYER**

Space communications protocols of the Application Layer provide users with end-to-end application services such as file transfer and data compression.

CCSDS has developed five protocols for the Application Layer:

a) Asynchronous Messaging Service (AMS) (reference [46]);

b) CCSDS File Delivery Protocol (CFDP) (reference [15]);

c) Lossless Data Compression (reference [16]);

d) Image Data Compression (reference [17]);

e) Lossless Multispectral & Hyperspectral Image Compression (reference [48]);

AMS is an application layer service for mission data system communications.

CFDP provides the functionality of the Application Layer (i.e., functions for file management. The CFDP Store-and-Forward Overlay procedures provide application-specific transfer of data across multiple link-layer hops.

Each project (or Agency) may elect to use application-specific protocols not recommended by CCSDS to fulfil their mission requirements in the Application Layer over CCSDS space communications protocols.

PDUs of an Application Layer protocol are usually transferred with a protocol of the Transport Layer over a space link, but they can be transferred directly with a protocol of the Network Layer if certain conditions are met.

Applications protocols used in the Internet (such as FTP, reference [26]) can also be used on top of SCPS-TP, TCP and UDP over space links.

------------------------------------------------------------------

CATEGORY OF REQUESTED CHANGE: Technical Fact

------------------------------------------------------------------

SUPPORTING ANALYSIS:

A transport layer protocol should provide transport services to a set of applications. In this sense, the multi-hop functionality that is part of CFDP store-and-forward overlay provides that functionality ONLY to CFDP and is in fact part of the CFDP application-layer protocol.

------------------------------------------------------------------

DISPOSITION: **Accepted**.

 CESG POLL ITEM DISPOSITION (PID) INITIATION FORM

AREA PID NUMBER: 02

SUBMITTING AREA: Space Internetworking Services (SIS)

------------------------------------------------------------------

REVIEWER'S NAME: Keith Scott

E-MAIL ADDRESS: kscott@mitre.org

------------------------------------------------------------------

DOCUMENT NUMBER: CCSDS 130.0-G-2.1 Proposed Green Book, Issue 2.1

DOCUMENT NAME: OVERVIEW OF SPACE COMMUNICATIONS PROTOCOLS

DATE ISSUED: March 2014

PAGE NUMBER: 2-7 PARAGRAPH NUMBER: 2.2.4

PID SHORT TITLE: Network Layer Services

------------------------------------------------------------------

DESCRIPTION OF REQUESTED CHANGE: (Use From: "..." To "..." format)

From:

**3.3 NETWORK LAYER**

**3.3.1 GENERAL FEATURES OF NETWORK PROTOCOLS**

CCSDS has one service for interfacing at the Network Layer: the Encapsulation Service. Within this service, there are two different types of packets: Space Packets defined in the Space Packet Protocol (reference [4]) and Encapsulation Packets defined in the Encapsulation Service (reference [29]). It should be noted that IP over CCSDS (reference [45]) utilizes only the Encapsulation Packet.

To:

**3.3 NETWORK LAYER**

**3.3.1 GENERAL FEATURES OF NETWORK PROTOCOLS**

CCSDS has two services for interfacing at the Network Layer: the Encapsulation Service and IP. Within the Encapsulation service, there are two different types of packets: Space Packets defined in the Space Packet Protocol (reference [4]) and Encapsulation Packets defined in the Encapsulation Service (reference [29]). IP over CCSDS (reference [45]) provides an IP service that utilizes the Encapsulation Packet.

Note: while the Space Packet protocol provides a service interface that could be used for access to the network layer, the service is subsumed by the Encapsulation service.

------------------------------------------------------------------

CATEGORY OF REQUESTED CHANGE: Technical Fact

------------------------------------------------------------------

SUPPORTING ANALYSIS:

Section 2.2.4 states that there are three standards for interfacing at the Network layer (Space packets, Encapsulation Service, and IP over CCSDS). While the Encapsulation Service can be used to invoke Space Packet delivery, one could also implement the Space Packet service interface without the encapsulation service.

Regardless of the above, IP-over-CCSDS also provides a service interface to the (IP) network layer protocol that is distinct from either of the above.

------------------------------------------------------------------

DISPOSITION: **Accept with Modification**.

Chgange as proposed with magenta additions.

CCSDS has two services for interfacing at the Network Layer: the Encapsulation Service and IP. Within the Encapsulation service, there are two different types of packets: Space Packets defined in the Space Packet Protocol (reference [4]) and Encapsulation Packets defined in the Encapsulation Service (reference [29]). IP over CCSDS (reference [45]) provides an IP service that exclusively utilizes the Encapsulation Packet.

Note: while the Space Packet protocol provides a service interface that could be used for access to the network layer, the service is subsumed by the Encapsulation service.

 CESG POLL ITEM DISPOSITION (PID) INITIATION FORM

AREA PID NUMBER: 03

SUBMITTING AREA: Space Internetworking Services (SIS)

------------------------------------------------------------------

REVIEWER'S NAME: Keith Scott

E-MAIL ADDRESS: kscott@mitre.org

------------------------------------------------------------------

DOCUMENT NUMBER: CCSDS 130.0-G-2.1 Proposed Green Book, Issue 2.1

DOCUMENT NAME: OVERVIEW OF SPACE COMMUNICATIONS PROTOCOLS

DATE ISSUED: March 2014

PAGE NUMBER: 3-10 PARAGRAPH NUMBER: 3.3.1

PID SHORT TITLE: Network Layer QoS

------------------------------------------------------------------

DESCRIPTION OF REQUESTED CHANGE: (Use From: "..." To "..." format)

From:

SPP and IP do not provide a function for retransmitting lost or corrupted data, so retransmission should be done by a higher-layer protocol if complete delivery of data is required.

To:

SPP and IP do not provide any QoS mechanisms for reliable delivery, in-order delivery, or duplicate suppression. If these functions are required they should be implemented by a higher-layer (e.g. transport layer) protocol.

------------------------------------------------------------------

CATEGORY OF REQUESTED CHANGE: Technical Fact

------------------------------------------------------------------

SUPPORTING ANALYSIS:

------------------------------------------------------------------

DISPOSITION: **Accepted**.

 CESG POLL ITEM DISPOSITION (PID) INITIATION FORM

AREA PID NUMBER: 04

SUBMITTING AREA: Space Internetworking Services (SIS)

------------------------------------------------------------------

REVIEWER'S NAME: Keith Scott

E-MAIL ADDRESS: kscott@mitre.org

------------------------------------------------------------------

DOCUMENT NUMBER: CCSDS 130.0-G-2.1 Proposed Green Book, Issue 2.1

DOCUMENT NAME: OVERVIEW OF SPACE COMMUNICATIONS PROTOCOLS

DATE ISSUED: March 2014

PAGE NUMBER: 3-10 PARAGRAPH NUMBER: 3.3.1

PID SHORT TITLE: Network Layer Addresses

------------------------------------------------------------------

DESCRIPTION OF REQUESTED CHANGE: (Use From: "..." To "..." format)

From:

An End System Address, used by IP, identifies a single end system or a group of end systems. When an End System Address is used, a pair of End System Addresses must be used to identify both source and destination end systems.

To:

An End System Address, used by IP, identify a single end system or a group of end systems. If it is necessary to identify both the source and destination when using End System Addresses, a pair of End System Addresses must be used.

------------------------------------------------------------------

CATEGORY OF REQUESTED CHANGE: Editorial

------------------------------------------------------------------

SUPPORTING ANALYSIS:

I suppose we don’t have any network layer that supports it, but one could envision a network layer service that only used a destination (and not a source) address.

------------------------------------------------------------------

DISPOSITION: **Accept with modification**.

An End System Address, used by IP, identifies a single end system or a group of end systems. If it is necessary to identify both the source and destination when using End System Addresses, a pair of End System Addresses must be used.

 CESG POLL ITEM DISPOSITION (PID) INITIATION FORM

AREA PID NUMBER: 05

SUBMITTING AREA: Space Internetworking Services (SIS)

------------------------------------------------------------------

REVIEWER'S NAME: Keith Scott

E-MAIL ADDRESS: kscott@mitre.org

------------------------------------------------------------------

DOCUMENT NUMBER: CCSDS 130.0-G-2.1 Proposed Green Book, Issue 2.1

DOCUMENT NAME: OVERVIEW OF SPACE COMMUNICATIONS PROTOCOLS

DATE ISSUED: March 2014

PAGE NUMBER: 3-10 PARAGRAPH NUMBER: 3.3.1

PID SHORT TITLE: CFDP Transport-Layer Service II

------------------------------------------------------------------

DESCRIPTION OF REQUESTED CHANGE: (Use From: "..." To "..." format)

From:

CFDP is designed to meet the needs of space missions to transfer files to and from an onboard mass memory. It is a file transfer protocol, but it also provides the functionality of the Transport Layer for detecting and retransmitting corrupted or lost data. It can be used on top of any protocol of the Network Layer (e.g., Space Packet Protocol, Encapsulation Service, IP over CCSDS), or directly on top of the TC Space Data Link Protocol or Proximity-1 Space Link Protocol if a Virtual Channel, a MAP, or a Port is dedicated to CFDP. In some circumstances it can be used on top of UDP, TCP or SCPS-TP. A summary of concept and rationale of CFDP is contained in reference [35].

To:

Delete this paragraph from 3.4 (Transport Layer) and use the modified version below to replace the following paragraph in 3.5 (Application Layer):

The CCSDS File Delivery Protocol (CFDP) provides the functionality of the Application Layer (i.e., functions for file management), but it also provides functions of the Transport Layer.

Modified version of the paragraph from 3.4

CFDP is designed to meet the needs of space missions to transfer files. It is a file transfer protocol, but it also provides services typically found in the Transport Layer, i.e. complete, in-order, without duplicate data delivery. It can be used on top of any protocol of the Network Layer (e.g., Space Packet Protocol, Encapsulation Service, IP over CCSDS), or directly on top of the TC Space Data Link Protocol or Proximity-1 Space Link Protocol if a Virtual Channel, a MAP, or a Port is dedicated to CFDP. In some circumstances it can be used on top of UDP, TCP or SCPS-TP. A summary of concept and rationale of CFDP is contained in reference [35].

------------------------------------------------------------------

CATEGORY OF REQUESTED CHANGE: Technical Fact

------------------------------------------------------------------

SUPPORTING ANALYSIS:

CFDP’s Transport Layer capabilities (more than just retransmission of lost data) are restricted to the CFDP application and are in fact part of the CFDP application-layer protocol.

------------------------------------------------------------------

DISPOSITION: **Accept with modification/clarification**.

**Insert in section 3.4 the following text.**

The CCSDS File Delivery Protocol (CFDP) provides the functionality of the Application Layer (i.e., functions for file management), but it also provides functions of the Transport Layer.

**Insert in section 3.5 the following text (and addition).**

CFDP is designed to meet the needs of space missions to transfer files. It is a file transfer protocol, but it also provides services typically found in the Transport Layer, i.e. complete, in-order, without duplicate data delivery. It can be used on top of any protocol of the Network Layer (e.g., Space Packet Protocol, Encapsulation Service, IP over CCSDS), or directly on top of the TC Space Data Link Protocol or Proximity-1 Space Link Protocol if a Virtual Channel, a MAP, an APID, or a Port is dedicated to CFDP. In some circumstances it can be used on top of UDP, TCP or SCPS-TP. A summary of concept and rationale of CFDP is contained in reference [35].