Page 2-7: [1] Deleted **Kazz, Greg J (313B)** **3/1/13 1:58 PM**

Internet Protocol (IP), Version 4 (reference [22]);

Internet Protocol (IP), Version 6 (reference [23]).

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SCPS Security Protocol (SCPS-SP) (reference [12]) and

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CCSDS has developed two protocols for the Network Layer:

Space Packet Protocol (reference [4]);

SCPS Network Protocol (SCPS-NP) (reference [11]).

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Internet Protocol (IP), Version 4 (reference [22]);

Internet Protocol (IP), Version 6 (reference [23]).

Protocol data units (datagrams) of IP Version 6 are transferred by Space Data Link Protocols using Encapsulation Packets defined in reference [29] in order for the Space Data Link Protocols to process IP Version 6 datagrams efficiently. Other protocols can also be transferred with the Space Data Link Protocols using the Encapsulation Service defined in reference [29].

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	Basic End System Address	End System Address	1 octet + 1 octet	SCPS address family addresses
	Basic Path Address	Path Address	1 octet	SCPS address family addresses
	IPv6 Address	End System Address	16 octets + 16 octets	IP version 6 addresses

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IP Version 6	IP Version 6 Address	End System Address	16 octets + 16 octets	

NOTES

The SCPS address family addresses are a subset of the IP version 4 address space with the first octet fixed to the decimal value of 10. They can be truncated to one octet (Basic Addresses) when there is no ambiguity in interpretation of the addresses.

Any of the five addresses shown above may be used for a SCPS-NP datagram.

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CCSDS has developed three protocols for the Application Layer:

SCPS File Protocol (SCPS-FP) (reference [14]);

Lossless Data Compression (reference [16]);

Image Data Compression (reference [17]).

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SCPS-FP provides a file transfer service and is designed to meet the needs of current and future space missions. It is based on FTP of the Internet and is intended to be used on top of SCPS-TP or TCP. A summary of concept and rationale of SCPS-FP is contained in reference [36].

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IP version 4;

IP version 6;

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SCPS-NP AND IP FOR END-TO-END ROUTING

In the second example, SCPS-NP and IP (either version 4 or 6) is used for end-to-end routing. This configuration is suited to space missions that require the extended addressing and routing capabilities provided by SCPS-NP and/or need to use SCPS or Internet upper-layer protocols.

Figure 4-4 shows an example of protocol configuration on a space link, and figure 4-5 shows an example of protocol configuration in an end-to-end space data system. In this configuration, SCPS-NP is used for routing except in the ground subnetwork where IP is used for routing. A gateway at the ground relay system performs protocol conversion between SCPS-NP and IP.

Most SCPS and Internet end-to-end protocols can be used on top of SCPS-NP and IP. SCPS-TP can be converted to TCP/UDP at a relay system. More information on this configuration is found in reference [35].

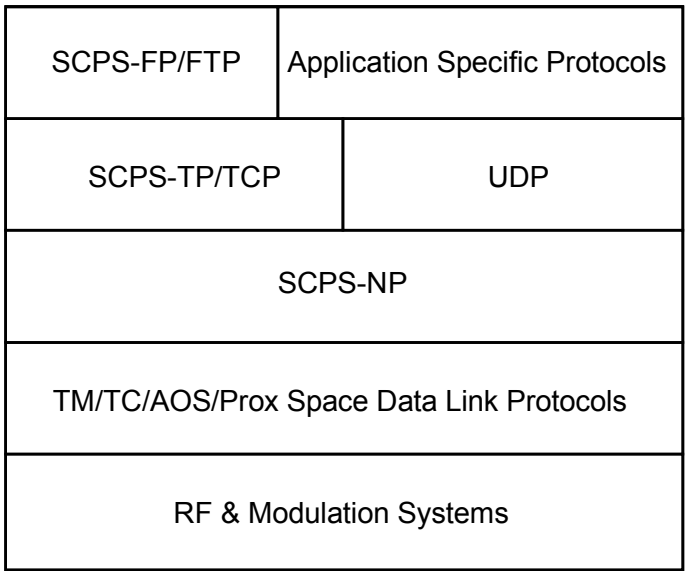

Figure 4-4: Protocol Configuration on a Space Link When SCPS-NP and IP Are Used for End-to-End Routing

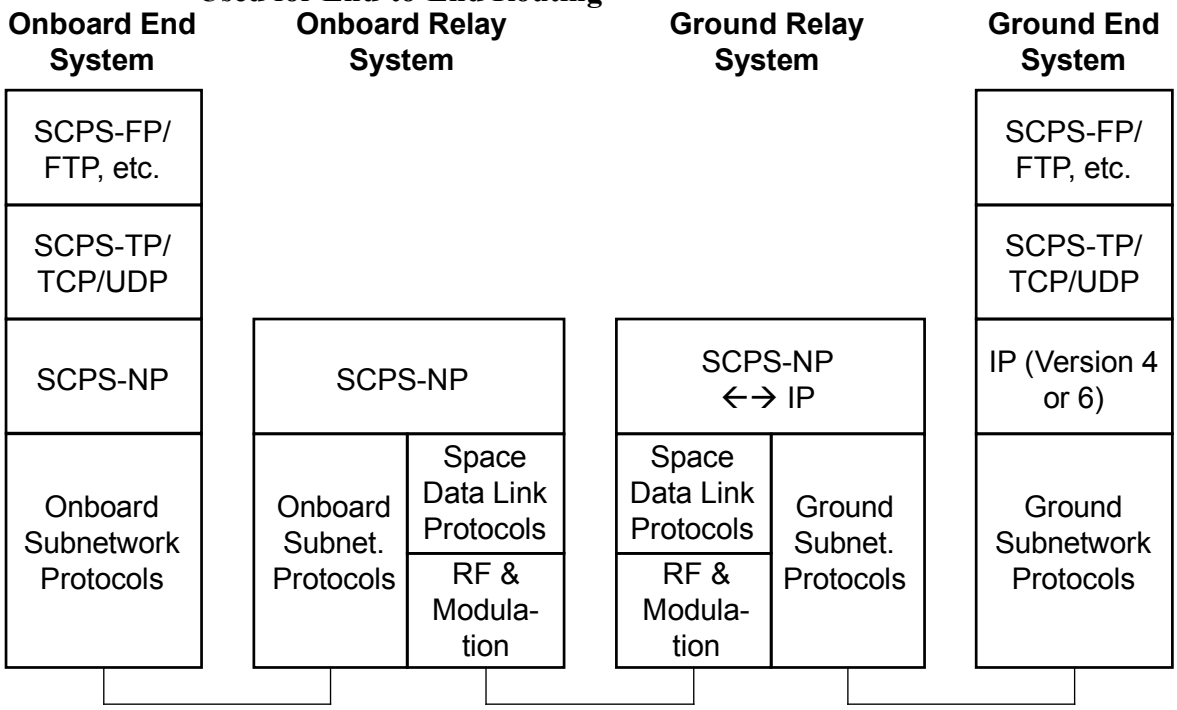

Figure 4-5: Protocol Configuration in a Space Data System When SCPS-NP and IP Are Used for End-to-End Routing

IP VERSION 4 FOR END-TO-END ROUTING

In the third example, IP version 4 is used for end-to-end routing. IP Version 4 is the protocol used for routing in the Internet, but it can also be carried by a Space Data Link

Protocol over a space link. This configuration is suited to space missions that require integration of their space segments into the Internet.

Figure 4-6 shows an example of protocol configuration on a space link, and figure 4-7 shows an example of protocol configuration in an end-to-end space data system.

In this example, it is assumed that the Internet is directly extended into the space segment. Most Internet end-to-end protocols and SCPS-TP can be used on top of IP Version 4. SCPS-TP can be converted to TCP/UDP at a relay system.

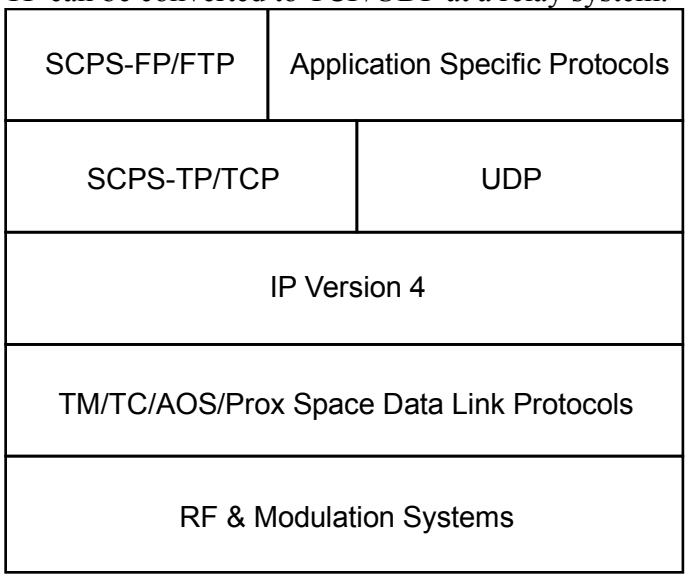

Figure 4-6: Protocol Configuration on a Space Link When IP Version 4 Is Used for End-to-End Routing

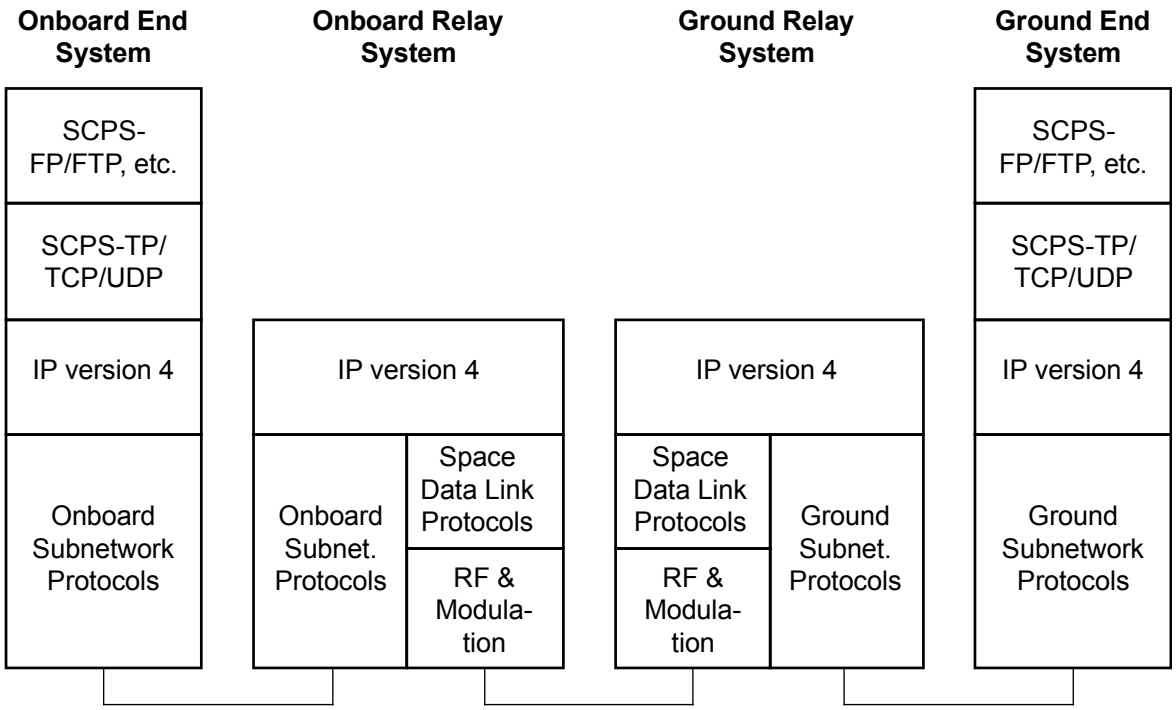

Figure 4-7: Protocol Configuration in a Space Data System When IP Version 4 Is Used for End-to-End Routing