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CDPD Protocols

The basic structuring of the Cellular Digital Packet Data (CDPD) Network is along the lines of the 7-layer OSI model. Each layer within CDPD may be further partitioned into a similar sequence of sub-layers. Each layer or sub-layer in the CDPD network communications architecture is defined with:

- Layer service access points.
- Layer service primitives.
- Layer protocol.
- Layer management entity.

The CDPD network specifications define a number of subprofiles as building blocks that may be selected and combined to define a particular CDPD network element. Subprofiles define the specific multi-layer protocol requirements for a CDPD network element or a CDPD network service. Three major classes of subprofiles are defined:

- Application subprofiles.
- Lower layer subprofiles.
- Subnetwork subprofiles.

The following diagram illustrates the CDPD protocols in relation to the OSI model:
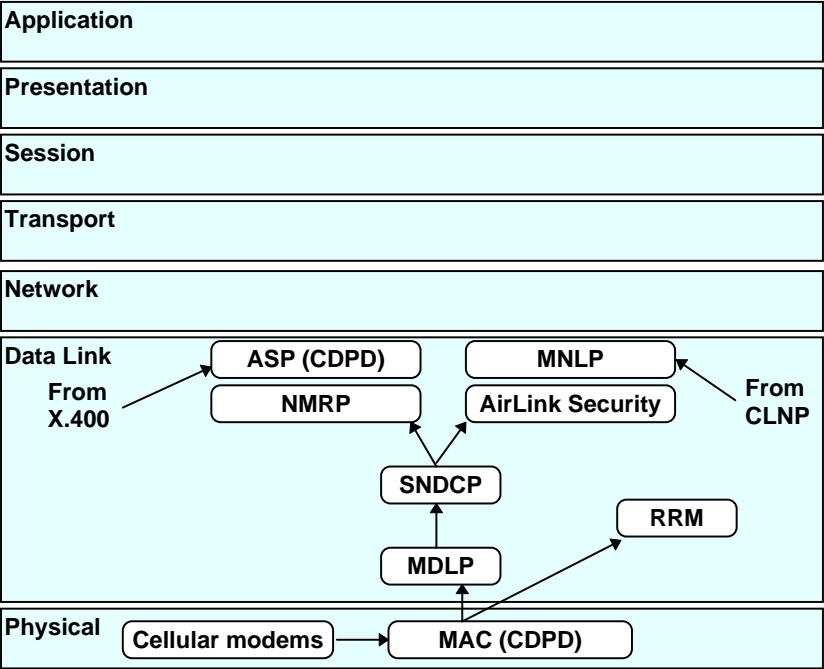
CDPD protocols in relation to the OSI model

MDLP

CDPD System Specification release 1.1, part 403

The Mobile Data Link Protocol (MDLP) is a protocol that operates within the data link layer of the OSI model to provide logical link control services between Mobile End Systems (M-ESs) and Mobile Data Intermediate Systems (MD-ISs).

MDLP utilizes the services of the CDPD MAC layer to provide access to the physical channel and transparent transfer of link-layer frames between data link layer entities.

The purpose of MDLP is to convey information between network layer entities across the CDPD Airlink interface. It supports multiple M-ESs sharing access to a single channel stream. The channel stream topology is that of a point-to-multipoint subnetwork. In such a subnetwork, direct communication is possible only between the user side and the network side of the channel stream. Direct communication between two M-ESs on the same channel stream is not possible.

The frame format of MDLP is as shown in the following illustration:

Address (1-4 octets)
Control (1-2 octets)
Information (optional)

MDLP frame structure

Address
Variable number of octets as shown in the following illustration:

Octet	8	7	6	5	4	3	2	1
1							C/R	EA=0
..				TEI				EA=0
4								EA=1

Address field structure

C/R

Command/response field bit identifies a frame as either a command or a response. The user side sends commands with the C/R bit set to 0 and responses with the C/R bit set to 1. The network side does the opposite.

TEI

Temporary equipment identifier. The TEI for a point-to-point data link connection is associated with a single M-ES. An M-ES may contain one TEI used for point-to-point data transfer. The TEI for a broadcast data link connection is associated with all user side data link layer entities. Values are encoded as unsigned binary numbers in a variable length field of a maximum 27 bits in length.

Control

Identifies the type of frame. Possible types are:

I   Numbered information transfer
S   Supervisory functions
U   Unnumbered information transfers and control functions.

Information

Integer number of octets containing the data.

SNDCP

CDPD System Specification release 1.1, part 404

The Subnetwork Dependent Convergence Protocol (SNDCP) provides a number of services to the network layer:

- Connectionless-mode subnetwork service.
- Transparent transfer of a minimum number of octets of user data.
- User data confidentiality.

The SN-Data PDU is conveyed over the acknowledged data link service in the DL-Userdata field of a DL-Data primitive. The format of the SN-Data PDU is as shown in the following illustration:

Octet	8	7	6	5	4	3	2	1
1	M	K	Comp type		NLPI			
2-n	Data segment							

SN-Data PDU structure

The SN-Unitdata PDU is conveyed over the unacknowledged data link service in the DL-Userdata field of a DL-Unitdata primitive. The format of the SN-Unitdata PDU is shown in the following illustration:

Octet	8	7	6	5	4	3	2	1
1	M	Reserved			NLPI			
2	Sequence ID				Segment number			
3-n	Data segment							

SN-Unitdata PDU structure

M
More segments bit. When set to 0, the current SN-Data PDU is the last data unit in a complete SN-Data PDU sequence.

K
Key sequence number. Indicates the parity of the encryption/decryption key used to encrypt the data segment field of the SN-Data PDU.

Comp type
Compression type field indicates the Network Layer header compression frame type. This field has meaning only in the first PDUI of a complete SN-

Data PDU sequence, but is copied unchanged into all PDUs in the sequence.

NLPI
Network layer protocol identifier, identifies the associated network layer protocol entities defined as follows:
0   Mobile Network Registration Protocol
1   Security Management Entity
2   CLNP
3   IP
4-15   Reserved for future use

Sequence ID
Identifies the subnetwork service data unit (SNSDU) to which the segment contained in this PDU belongs. All segments belonging to the same SNSDU have the same sequence identifier.

Segment number
Each segment is assigned a segment number, which is sequentially assigned starting from zero. A complete sequence of SN-Unitdata PDUs can consist of 1 to 16 consecutive segments.

Data segment
Exactly one segment of the subnetwork service data unit. The maximum size of a data segment is 128 octets.