PCCA STANDARD

Command Set Extensions for CDPD Modems

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CONTENTS

1. ANNEX L: COMMAND SET EXTENSIONS FOR CDPD MODEMS

This Annex defines the extensions to the PCCA STD-101 for CDPD modems. These extensions use the **+WP** command prefix. It is intended that all CDPD modems will eventually implement at least the mandatory commands defined in this Annex to allow standardization of protocol scripts and diagnostics across different protocol stacks and CDPD network service providers.

1.1 Scope

Under the definitions set forth in PCCA STD-101, CDPD related commands described in this Annex form a *WDS-Specific AT Command Set* which controls modem operation only when **+WS46=4** (representing selection of CDPD service). This Annex does not extend the *Common AT Command Set* for the PCCA. However it does discuss the syntax and behavior of the **ATD** command when **+WS45** is set to one of the transparent character stream settings.

1.2 Applicable Documents

The following standards and other publications contain provisions or normative references which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Each publishing standards body maintains a register of currently valid national, international, and industry standards published by them.

PCCA STD-101	*Data Transmission Systems and Equipment - Serial Asynchronous Automatic Dialing and Control for Character Mode DCE on Wireless Data Services, PCCA Recommended Standard, July, 1995*
RFC 990	*Assigned Numbers, Internet Request for Comments, November, 1986*
RFC 1700	*Assigned Numbers, Internet Request for Comments, October, 1994*
RFC 1883	*Internet Protocol, Version 6 (IPv6) Specification, Internet Request for Comments, December, 1995*
RFC 1884	*IP Version 6 Addressing Architecture, Internet Request for Comments, December, 1995*

1.3 Compliance

1.3.1 General Compliance

For compliance with this Annex, a DCE must implement all mandatory commands described herein in addition to those defined in PCCA STD-101. A DCE, however, may still be compliant with PCCA STD-101, and may implement a partial set of the commands in this Annex without claiming compliance with this Annex.

1.3.2 Circuit-Switched and Packet-Switched CDPD Compliance

CDPD system specifications permit two modes of DCE operation: circuit-switched, and packet-switched. This Annex defines general-purpose CDPD commands, as well as commands and command options specific to either circuit-switched or packet-switched operation.

For compliance with this Annex, a DCE limited to operation in packet-switched CDPD mode need not implement commands or command options specific to circuit-switched operation. Conversely, a DCE limited to operation in circuit-switched CDPD mode need not implement packet-switched commands and command options. Refer to the Table in Section 1.7 for a summary of mandatory and optional commands in each mode.

1.4 Resources requested

CDPD has been allocated a specific code (**4**) in the **+WS46** WDS name space. Several of the DTE side protocol stacks listed in Section 7.1 of the PCCA STD-101 could be relevant to a CDPD DCE:

+WS45 CODE	**DESCRIPTION**
0	Transparent Character Stream
1	Reliable Transparent Character Stream
2	Common Packet Protocol (CPP)
3	SLIP
4	PPP

CDPD has also been allocated the **+WP** command set for command extensions not common with STD-101 or other Annexes. In addition, **S** Registers **+WS173** to **+WS199** are allocated for CDPD specific use.

1.5 New Commands and Formats

This Annex includes commands specifically defined to allow for script automation. These typically return numeric results of important parameters such as registration status in accordance with ANSI/TIA/EIA 602 and 615 standards.

In addition, several verbose commands are provided which allow users to request information that can be used to debug network or modem anomalies. These commands display status and results as text to be read by the user, which may include multiple lines of status information. Each line typically includes text and a value.

In all cases, the commands return status information in uppercase format as shown in the command description. White space is allowed within text, but not within values Table 1.7 lists all the commands and **S** Registers and identifies commands as mandatory or optional.

TIA 615-1993 section 5.3 defines two parameter types, numeric and string, and allows construction of compound parameters. This standard defines one new compound parameter and a specific format for a string parameter in accordance with TIA-615 syntax rules.

1.5.1 Compound Parameter *IP_Spec*

The compound parameter ***IP_Spec*** is used to represent Internet Protocol version 4 (IPv4) and version 6 (IPv6) addresses. The format for this compound data type is as defined below:

<IP_Spec> <address>[**,**[<port >][**,**[<type>]]]

<address > For IPv4 addresses, a formatted string:
"[<v4_part>][**,**[<modifier_part>]]**"**
For IPv6 addresses, a formatted string:
"[<v6_part>][**,**[<modifier_part>]]**"**

<port> A decimal integer in the range **1** to **65535**, indicating an internet port number (typically a TCP or UDP port number). The default value of this sub-parameter is command-specific

<type> A decimal integer, identifying the address family, one of:
138 indicates an IPv6 format for <address>
142 indicates an IPv4 format for <address>
The default value of this sub-parameter is manufacturer-specific, and may be context-sensitive.

<v4_part> A 32-bit IPv4 address, represented using ASCII / IA5 characters in the dotted decimal format described on page 5 of Internet RFC 990[1], Assigned Numbers. For example, the 32-bit address indicated by hexadecimal AA227145 would be represented as **176.34.112.69**.

<v6_part> A 128-bit IPv6 address, represented using ASCII / IA5 characters in any of the formats described in Section 2.2 of Internet RFC 1884, IP Version 6 Addressing Architecture. For example, the 128-bit address indicated by hexadecimal 10800000000000000000080800200C417A could be represented as **1080::8:800:200C:417A** or in any other format allowed by RFC 1884.

<modifier_part> A single ASCII / IA5 character identifying the type of address, one of:
S indicates a station (unicast) address
M indicates a multicast address
B indicates a broadcast address
A indicates an anycast address (IPv6)
Other values for this character are reserved for future standardization. If absent, the address is assumed to be a station address.

Note that IPv6 as defined in RFC 1883 subsumes all IPv4 addresses into the IPv6 address space. This leads to the possibility of multiple valid representations of an IPv4 address can

The DCE displays the current value of an IP_Spec compound parameter (e.g. in response to **?**) using any of several implementation-dependent formats subject to four rules:

1. The display format for an IP_Spec shall correspond to an allowed input format for an IP_Spec;

2. If the command accepts a <modifier_part>, and the <modifier_part> is set to *station*, display of the **,S** suffix is optional;

[1] Although RFC 990 has been obsoleted by RFC 1700 and others, it is the most recent version of the Assigned Numbers RFC to provide an explicit definition of dotted decimal format. More recent versions use identical address formatting, but refer to "normal Internet dotted decimal notation" without providing a definition.

3. No trailing commas will be displayed;

4. IPv6 as defined in RFC 1883 subsumes all IPv4 addresses into the IPv6 address space. The leading 96 bits of an IPv4 address represented in IPv6 space are all zeros. The DCE may choose (manufacturer's option) to display IPv4 addresses as either IPv4 or IPv6 addresses, using any format allowed by RFC 1884, regardless of which format was used to enter the IP_Spec compound parameter to the DCE.

Non-exhaustive examples of allowable display formats for the IPv4 station IP address 123.45.0.6 and port number 7 include:

"123.045.000.006,S",00007,142	(optional zeros, family and type displayed)
"123.045.000.006",00007	(opt. zeros, IPv4 and type *station* implied)
"123.45.0.6",7	(no optional zeros; type not accepted)
"123.45.0.6"	(port number and type not accepted)
"123.45.0.6,S"	(port number not accepted, type displayed)
"::7B23:6,S",7,138	(Displayed as IPv6 address, preferred form)
"::123.45.0.6,S",7,138	(Displayed as IPv6 address, alternative form)
"0000:0000:0000:0000:0000:0000:7B23:0006,S",00007,138	(Displayed as canonical IPv6 address)

The range of valid values for an IP_Spec parameter is displayed (e.g. in response to **=?**) as :

"(address),(A,B,M,S)",(0-65535),(138,142)

Several additional rules apply to range reporting for the IPv4_Spec:
1. The letters **(address)** are displayed literally, and indicate that either a <v4_part> or a <v6_part> may be entered.
2. All commands using the IP_Spec compound parameter shall permit entry of any value in the supported range for <address>, <port>, and <type>.
3. All commands using the IP_Spec compound parameter shall support at least one value for each of the subparameters <address>, <port>, and <type>.
4. Unsupported values of any subparameter may be excluded from the range display, so long as at least one value is supported. For example, a command supporting only IPv4 station addressing with no meaning assigned to the <port> field may report:
   "(address),(S)",(0),(142)
   As a second example, many commands will omit **0** from the range of valid values for <port>

1.5.2 **String Parameter *Dial_Spec***

The *Dial_Spec* represents AMPS-compatible dialing digit sequences within a string parameter. The format for this parameter is as defined below:

<Dial_Spec>	A quoted string of between 1 and 32 origination digits selected from the ASCII / IA5 set (**0**, **1**, **2**, **3**, **4**, **5**, **6**, **7**, **8**, **9**, *****, **#**), and manufacturer-specific dial modifiers which may be combined with the origination digits according to manufacturer-specific rules within the limits of TIA-615 string parameter syntax..

The DCE displays the current value of a Dial_Spec parameter (e.g. in response to **?**) as a simple quoted text string. For the imaginary value *800330, the DCE displays:

"*800330"

Note that some implementations may ignore some dial modifiers, and may choose not to store the values of ignored dial modifiers as part of the parameter value.

The range of valid values for a Dial_Spec parameter is displayed (e.g. in response to **=?**) as :

"(dialstring)"

Two additional rules apply to range reporting for the Dial_Spec:

1. The letters **(dialstring)** are displayed literally, and indicate any mix of characters described above.

2. A command may further restrict the number of origination digits, the use of dial modifiers, or both, as described in the command definition.

1.6 ATD Command

Dial modifiers **T** (54 hex) or **P** (50 hex) in the initial position after **ATD** are permitted but in all cases ignored;

In DCE that support upper and lower case command entry, the dial modifier **t** (74 hex) is equivalent to **T** in all contexts, and the dial modifier **p** (70 hex) is equivalent to **P** in all contexts;
Regardless of the setting of **+WS45**, in the event that the DCE is not currently registered on the CDPD network, and the setting of parameter **+WS176** is non-zero, the **ATD** command shall initiate auto-registration of the NEI indexed by **+WS176** (if applicable, prior to initiating connection to the destination). The setting of **+WS179** shall determine if the DCE shall wait for registration to complete or go directly into an On-line state. The time to wait, if any, for successful registration is defined by **+WS198.**

Implementations may support vendor-specific dial modifiers, and may support the use of a trailing semicolon to return the modem to on-line command state after command operation. **ATD** may produce vendor-specific intermediate result codes.

1.6.1 ATD Operation for Network Registration

When **+WS46=4** and **+WS45** is set so as not to require a single-destination address setting, **ATD** shall be used to initiate connection of the DCE to the CDPD network. The syntax shall be as follows:

ATD[**T**|**P**][<vendor-specific dial modifiers>]

The final result code for **ATD** shall be one of the following (or numeric equivalent) as appropriate:

CONNECT	Successful connection, unspecified data rate
CONNECT d	Successful connection at rate d (decimal value connect rate)
BUSY	Unable to connect due to congestion or explicit refusal of connection by destination
NO CARRIER	Unable to connect due to time-out (e.g. no host response) or unsuccessful registration to the CDPD network
NO DIALTONE	Unable to connect due to no RF coverage

ERROR	Invalid dial string, or connection already established
NO ANSWER	A translation of some other code based on ATXn setting; may also be used to signal connection failure for reasons not covered by any other result code or not distinguishable by the DCE implementation.

1.6.2 ATD Operation with PAD Functionality

When **+WS46=4** and **+WS45** is set to a transparent character stream setting or any other supported single-destination address setting, **ATD** shall be used to initiate connection of the DCE to the destination. The syntax is as follows:

ATD[**T**|**P**][<vendor-specific dial modifiers>]<IP_Spec>

If unspecified but required for communication establishment, the value of the <port> subparameter of the IP_Spec takes on a vendor-specific default which may be context-dependent (e.g. based on the value of parameter **+WS45**).

If unspecified but required for communication establishment, the value of the <address> and <type> subparameters of the IP_Spec takes on vendor-specific defaults which may be context-dependent (e.g. based on the value of optional parameter **+WPDEST**).

The specified **ATD** command syntax defines 4 features, each of which is optional. Furthermore, each such feature implemented must be implemented at least as described above, or the implementation is non-compliant. The features are:

1) Dial using **ATD[T|P]**, optional vendor-specific dial modifiers, and implied (default) IP_Spec value
2) Dial as in (1) above, using explicit values for <address> and <type> subparameters
3) Dial as in (1) above, using explicit value for <port> subparameter of IP_Spec
4) Dial as in (1) above, using explicit IP_Spec value

1.6.3 Interaction of ATD, +WS176, and +WS197 (Informative)

The **ATD** command causes the DCE to transition from command state to on-line command state or on-line data state. If appropriate during processing of the **ATD** command (based on the current operating state and the value of **+WS173** *Registration Control*), the DCE registers itself on the CDPD network using the NEI indexed by **+WS176**.

+WS176 *Auto-Registration NEI Index* is an index in the range 1..N into a list of N programmable NEIs. The **+WPNEILIST** command displays this list, and the **+WPNEI** command modifies this list. The value of N is implementation dependent. The value **+WS176=0** has special meaning, as described below.

The **+WS197** *NEI Index* parameter is another index in the range 1..N into the same NEI list referenced by **+WS176**. The **+WS197** parameter selects which NEI index is modified by the **+WPNEI** command, allowing the DTE to modify the NEI list without changing **+WS176**. The **+WS197** parameter also selects which NEI is registered by a **+WPREG** command, or deregistered by a **+WPDEREG** command, allowing the DTE to register multiple NEIs in addition to, or instead of, any NEI automatically registered based on the setting of **+WS176**.

When **+WS176=0**, the value of **+WS197** is used as both the NEI index and the auto-registration NEI index. When operating with **+WS176=0**, the DCE may place implementation-specific restrictions on the use or operation of the **+WPNEI** command. Regardless of the value of **+WS176**, the DCE may place implementation-specific restrictions on changes to **+WS176** in certain operating states (e.g. during a registration sequence).

The **+WPCURNEI** command displays the NEI indexed by **+WS176**; in the special case that **+WS176=0**, **+WPCURNEI** displays the NEI indexed by **+WS197**.

The **+WS173** parameter determines conditions under which the DCE will attempt automatic registration of the NEI indexed by **+WS176**; that is, registration without the DTE first issuing a **+WPREG** or **ATD** command.

1.7 Table of Commands/S Registers

Section No.	Command/S Register	+WP/+WS	Mandatory	Optional
1.8.1	Display CDPD Status Information	STATE	X	
1.8.2	Destination Address	DEST		X
1.8.3	Display Channel Information	CHANINFO	PS	
1.8.4	Service Provider Network Identifier Selection	SPNI		X
1.8.5	Wide Area Service Identifier Selection	WASI		X
1.8.6	Service Provider Identifier Selection	SPI		X
1.8.7	Display Service	SERVICE	X	
1.8.8	Default Dial Code for CS-CDPD	CSDC	CS	
1.8.9	Network Callback Number for CS-CDPD	CSCB	CS	
1.8.10	Preferred AMPS SID Numbers for CS-CDPD	CSSID		CS
1.8.11	Configure Network Entity Identifiers (NEI)	NEI	X	
1.8.12	List All Network Entity Identifiers	NEILIST	X	
1.8.13	Deregister NEI From Network	DEREG	X	
1.8.14	Register NEI to Network	REG	X	
1.8.15	Ping	PING		X
1.8.16	Display Connection Information for CS-CDPD	CSINFO	CS	
1.8.17	Display Electronic Identification (EID)	EID	X	
1.8.18	Select Channel	CHAN		PS
1.8.19	Display RSSI/Channel State	RSSI	X	
1.8.20	Display Registration State	REGSTATE	X	
1.8.21	Configure CS-CDPD NAM	NAM	CS	
1.8.22	Display Current Point-to-Point NEI	CURNEI		X
1.8.23	Display Supported Annex L Commands	+WCXL	X	
1.9.1	Registration Control	173	X	
1.9.2	Scan Preference	174		PS
1.9.3	CDPD Sleep Idle Time	175	PS	
1.9.4	Auto-Registration NEI	176		X
1.9.5	Destination Address Selection	177		X
1.9.6	CS-CDPD NAM Index	178	CS	
1.9.7	On-line Control Preference	179	X	
1.9.8	Acquisition Failure Sleep Timer	180		X
1.9.9	Service Preference	181	X	
1.9.10	TCP Header Compression (Informative)			
1.9.11	CS-CDPD Initial Call Retry Limit	183	CS	
1.9.12	CS-CDPD Connection Request Retry Limit	184	CS	
1.9.13	CS-CDPD Reconnection Request Retry Limit	185	CS	
1.9.14	CS-CDPD Link Reset Request Retry Limit	186	CS	
1.9.15	CS-CDPD Reconnection Call Retry Limit	187	CS	
1.9.16	CS-CDPD Receive Timer	188	CS	
1.9.17	CS-CDPD Connection Response Timer	189	CS	
1.9.18	CS-CDPD Reconnection Response Timer	190	CS	
1.9.19	CS-CDPD Disconnect Timer	191	CS	
1.9.20	CS-CDPD Inactivity Timer	192	CS	
1.9.21	CS-CDPD Link Reset Acknowledge Timer	193	CS	
1.9.22	CS-CDPD Reconnection Retry Timer	194	CS	
1.9.23	CS-CDPD Connection Retry Timer	195	CS	
1.9.24	Data Compression	196		X
1.9.25	NEI Index	197	X	
1.9.26	Registration Wait Time	198	X	
1.9.27	Acquisition Persistence	199		X

Key: PS Indicates Mandatory or Optional for Packet Switched CDPD devices
CS Indicates Mandatory or Optional for Circuit Switched CDPD devices

X Indicates Mandatory or Optional for both device types

1.8 Commands with CDPD specific syntax

The following commands define an extension to the PCCA STD-101 command set for use in the CDPD WDS mode of the DCE. The primary purpose of these additions is to have a common standard for implementation of DCEs supporting the CDPD WDS. The commands have alphanumeric syntax as opposed to the **S**-register syntax. Command set extensions with S-register type syntax are listed in Section 1.9.

The *parameter visibility* and *parameter volatility* for each of these commands is manufacturer-specific (see PCCA STD-101, Section 3.8 and Section 5.4).

Implementor Note - DCEs which return only **"PACKET"** in response to a **+WPSERVICE=?** command, are not required to support the mandatory Circuit Switched CDPD unique commands: **+WPCSINFO**, **+WPCSDC**, **+WPNAM**, and **+WPCSCB**. Conversely, DCEs which do not return a **"PACKET"** in response to a **+WPSERVICE=?**, are not required to support the mandatory Packet Switched CDPD unique command **+WPCHANINFO.**

1.8.1 Display CDPD Status Information

Syntax

+WPSTATE	(display current CDPD status defined below)
+WPSTATE?	(not allowed - returns **ERROR**)
+WPSTATE=?	(returns **OK**)

Description

This action command causes the return of CDPD status information. The following information is returned.

+WPSTATE returns a multi-line list of CDPD status information as defined below followed by the appropriate TIA-602 result code (OK or 0). Note that only current valid Status for each Descriptor is returned as shown in the example. All output shall be in upper-case.

Status	**Descriptor**
PACKET	**SERVICE TYPE**
CS-AMPS	
CS-PSTN	
YES	**FORWARD CHANNEL ACQUIRED**
NO	
NA	
YES	**MULTIFRAME MODE**
NO	
NA	
ddd.ddd.ddd.ddd	**VALID NEI**
NO	
hhhhhhhh	**TEI ASSIGNED**
NO	
NA	
REGISTERED	**REGISTRATION STATUS**
PENDING	
NO	
DENIED_NO_REASON	
DENIED_ MDIS_INCAPABLE	
DENIED_NEI_NOT_AUTHORIZED	
DENIED_INSUFFICIENT_CREDENTIALS	
DENIED_UNSUPPORTED_CREDENTIALS	
DENIED_NEI_EXCEEDED_USAGE	
DENIED_THIS_SUBNETWORK	
<optional mfr.-specific text, any # of lines>	
OK or **0** (based on V parameter setting)	

For example, one possible output of the command line **AT+WPSTATE** is shown below:

```
PACKET                          SERVICE TYPE
YES                             FORWARD CHANNEL ACQUIRED
YES                             MULTIFRAME MODE
127.000.000.001                 VALID NEI
3E01F201                        TEI ASSIGNED
REGISTERED                      REGISTRATION STATUS
OK
```

Spacing between fields (e.g. between **PACKET** and **SERVICE TYPE**) is implementation dependent, but all fields must be separated by at least one blank (ASCII / IA5 Hex 20); capitalization, punctuation, and spacing within fields (e.g. the single space between capitalized **SERVICE** and **TYPE**) shall exactly match this standard.

The TEI, if assigned, is presented as an eight character hex value. Leading zeros are permitted, but not required.

The NEI, if valid, is presented as either a <v4_part> or a <v6_part> as described in Section 1.5.1 of this Annex, based on whether the NEI is an IPv4 or an IPv6 address.

Forward Channel Acquired, Multiframe Mode and TEI Assigned shall have a **NA** (Not Applicable) response when Service Type is CS-AMPS or CS-PSTN.

Implementation

Implementation of this command is mandatory.

1.8.2 Destination Address

Syntax

+WPDEST=<n>**,**<IP_Spec>
(set address and optional port number at specified location; <modifier_part> defaults to **S**, and only **S** is valid)

+WPDEST?
(display current [as specified by **+WS177**] location, address and port number using format
n,IP_Spec
where n is replaced by the current value of **+WS177**, and IP_Spec is replaced by the current value of the associated destination IP address, port number, and family displayed as shown in Section 1.5.1)

+WPDEST=?
(display range of valid parameter settings
(1-n**),"(address),(S)",(1-65535),(138,142)**
or similar output in accordance with TIA-615 and Section 1.5.1 of this Annex)

Description

IP address of Remote End System for use with the **ATD** command when **+WS45=0** or **+WS45=1**. This command returns or sets the IP address and port number of the remote end system (destination). The parameters set up by this command are used in conjunction with **+WS177** and the **ATD** command.

Note that this command does not change the value of parameter **+WS177**.

Defined Values

n selects which one of the stored destination addresses is being set. **n** ranges from 1 to an implementation defined upper bound.

IP_Spec is as defined in Section 1.5.1 of this Annex. The default value of the <port> subparameter of the IP_Spec for this command is 7 (standard TCP port number).

Implementation

Implementation of this command is optional.

1.8.3 Display Channel Information

Syntax

+WPCHANINFO	(displays current Packet Switched CDPD channel information)
+WPCHANINFO?	(not allowed - returns **ERROR**)
+WPCHANINFO=?	(returns **OK**)

Description

Displays the CDPD WDS channel information.

+WPCHANINFO returns a multi-line list of CDPD channel information as defined below. Note that only current valid status for each descriptor is returned as shown in the example.

Status	**Descriptor**
dd	**CSI**
hhhhhhhh	**GLCI**
d	**AREA**
ddddd	**SPNI**
ddddd	**SPI**
ddddd	**WASI**
-ddd	**RSSI**
dddd	**CHANNEL**
NOT_AVAILABLE	**STATE**
SCANNING	
INITIAL_ACQUIRE	
ACQUIRED	
SLEEPING	
WAKING	
dd	**TX LEVEL**
+ddd/ddd/ddd/ddd	**RSSI SCAN HYST/INTERVAL/DELTA/AVG**
ddd/ddd	**BLER THRESHOLD/TIME**
+ddd	**ERP DELTA**
<optional mfr.-specific text, any # lines>	
OK or **0**	

d represents a decimal value. Leading 0's and + sign are permitted, but not required.
h represents a hexadecimal value. Leading 0's are permitted, but not required.

Spacing between fields (e.g. between dd and **TX LEVEL**) is implementation dependent, but fields must be separated by at least one blank (ASCII / IA5 Hex 20); capitalization and spacing within fields (e.g. the single space between capitalized **TX** and **LEVEL**) shall exactly match this standard.

Returns only **ERROR** if current CDPD service type returned by **+WPSERVICE?** Is not **"PACKET"**.

For example, one possible output of **AT+WPCHANINFO** is shown below:

```
63                  CSI
3E01F201            GLCI
0                   AREA
65535               SPNI
65535               SPI
65535               WASI
-101                RSSI
1023                CHANNEL
ACQUIRED            STATE
10                  TX LEVEL
+8/90/8/5           RSSI SCAN HYST/INTERVAL/DELTA/AVG
20/5                BLER THRESHOLD/TIME
+8                  ERP DELTA
OK
```

Implementation

Implementation of this command is mandatory for DCEs that support Packet Switched CDPD per **+WPSERVICE=?**.

1.8.4 Service Provider Network Identifier Selection

Syntax

+WPSPNI=[n1[**,**n2[...[**,**nx]]]]	(set list of required SPNIs)
+WPSPNI?	(display current list of required SPNIs, comma separated)
+WPSPNI=?	(display range of valid parameter settings using format **(0-65535)** to indicate that each n may take on values in the range)

Description

Returns or sets a required list of Service Provider Network Identifiers (SPNIs). If this list has any entries, the modem will register only with service providers broadcasting a SPNI matching one of the list entries. If the list is empty, the modem will ignore the broadcast SPNI when selecting a service provider with which to register. The list is represented by a series of SPNI values separated by commas. The list can be made empty by entering **+WPSPNI=**<CR> or **+WPSPNI=0**<CR> removing the requirement for finding a matching SPNI before registering. The length of the list is implementation dependent.

Defined Values

Each n1-nx is a decimal integer in the range (0-65535)

Implementation

Implementation of this command is optional. The number of SPNIs allowed in the list is implementation specific.

Implementation Note (Informative): Refer to the description of the optional **+MA** command in ITU-T V.25ter for an example of similar handling of **=?** for a variable-length parameter list.

1.8.5 **Wide Area Service Identifier Selection**

Syntax

+WPWASI=[n1[**,**n2[...[**,**nx]]]]	(set list of required WASIs)
+WPWASI?	(display current list of required WASIs, comma-separated)
+WPWASI=?	(display range of valid parameter settings using format **(0-65535)** to indicate that each n may take on values in the range)

Description

Returns or sets a required list of Wide Area Service Identifiers (WASIs). If this list has any entries, the modem will register only with service providers broadcasting a WASI matching one of the list entries. If the list is empty, the modem will ignore the broadcast WASI when selecting a service provider with which to register. The list is represented by a series of WASI values separated by commas. The list can be made empty by entering **+WPWASI=**<CR> or **+WPWASI=0**<CR> removing the requirement for finding a matching WASI before registering. The length of the list is implementation dependent.

Defined Values

Each n1-nx is a decimal integer in the range (0-65535)

Implementation

Implementation of this command is optional. The number of WASIs allowed in the list is implementation specific.

Implementation Note (Informative): Refer to the description of the optional **+MA** command in ITU-T V.25ter for an example of similar handling of **=?** for a variable-length parameter list.

1.8.6 **Service Provider Identifier Selection**

Syntax

+WPSPI =[n1[,n2[...[nx]]]]	
	(set list of required SPIs)
+WPSPI?	(display current list of required SPIs)
+WPSPI=?	(display range of valid parameter settings using format **(0-65535)** to indicate that each n may take on values in the range)

Description

Returns or sets a required list of Service Provider Identifiers (SPIs). If this list has any entries, the modem will register only with service providers broadcasting a SPI matching one of the list entries. If the list is empty, the modem will ignore the broadcast SPI when selecting a service provider with which to register. The list is represented by a series of SPI values separated by commas. The list can be made empty by entering **+WPSPI=**<CR> or **+WPSPI=0**<CR> removing the requirement for finding a matching SPI before registering. The length of the list is implementation dependent.

Defined Values

Each n1-nx is a decimal integer in the range (0-65535)

Implementation

Implementation of this command is optional. The number of SPIs allowed in the list is implementation specific.

Implementation Note (Informative): Refer to the description of the optional **+MA** command in ITU-T V.25ter for an example of similar handling of **=?** for a variable-length parameter list.

1.8.7 **Display Service**

Syntax

+WPSERVICE	(undefined - mfr. specific behavior or returns **ERROR**)
+WPSERVICE?	(display the current service)
+WPSERVICE=?	(display a list of available services)

Description

Displays the current CDPD service mode of the DCE.

+WPSERVICE? returns one of the string parameter values listed below:

Packet Switched CDPD	**"PACKET"** **OK** or **0**
Circuit Switched CDPD via AMPS	**"CS-AMPS"** **OK** or **0**
Circuit Switched CDPD via PSTN	**"CS-PSTN"** **OK** or **0**

+WPSERVICE=? behaves according to TIA-615 rules for read-only parameter commands and must enumerate only the supported services (as a comma-separated list of string constants within parenthesis). For example, a DCE supporting both Packet Switched CDPD and Circuit Switched CDPD via AMPS would report:

("PACKET","CS-AMPS")

in response to +WPSERVICE=?

Implementation

Implementation of this command is mandatory and is based on the preferences supported by **+WS181**.

Note - DCEs which return only **"PACKET"** in response to **+WPSERVICE=?** command, are not required to support the mandatory Circuit Switched CDPD unique commands: **+WPCSINFO**, **+WPCSDC**, **+WPNAM**, and **+WPCSCB** nor the Circuit Switched CDPD **S** registers. Conversely, DCEs which do not return **"PACKET"** as part of the response to **+WPSERVICE=?** are not required to support the mandatory Packet Switched CDPD unique command **+WPCHANINFO.**

1.8.8 Default Dial Code for CS-CDPD

Syntax

+WPCSDC=<Dial_Spec>	(set the dial string)
+WPCSDC?	(display the current default dial code, as a string parameter value)
+WPCSDC=?	(display valid parameter values, using format **("dialstring")** to indicate that the parameter is a dial string expressed as a string parameter)

Description

Returns or sets the circuit switched CDPD service default dial code as specified in the Circuit Switched CDPD Implementors Guidelines.

Defined Values

Valid values for the <Dial_Spec> are defined in Section 1.5.2. Dial modifiers, if allowed, are manufacturer-specific. All input and output values are enclosed in quotes.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**. The value of <Dial_Spec> should be consistent with EIA/TIA-602 and the CS-CDPD Implementors Guidelines.

1.8.9 Network Callback Number for CS-CDPD

Syntax

+WPCSCB= <Dial_Spec>	(set the dial string)
+WPCSCB?	(display the current dial string)
+WPCSCB=?	(display valid parameter values, using format **("dialstring")** to indicate that the parameter is a dial string expressed as a string parameter)

Description

Returns or sets the number for the circuit switched CDPD network to call back the mobile, encoded as specified in the Circuit Switched CDPD Implementors Guidelines.

Defined Values

Valid values for the <Dial_Spec> are defined in Section 1.5.2. Dial modifiers, if allowed, are manufacturer-specific. All input and output values are enclosed in quotes.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**. The value of <Dial_Spec> should be consistent with EIA/TIA-602 and the CS-CDPD Implementation Guidelines.

1.8.10 **Preferred AMPS SID Numbers for CS-CDPD**

Syntax

+WPCSSID=[n1**,**[n2[...[**,**nx]]]]	(set the preferred SID list)
+WPCSSID?	(display the current preferred SID list)
+WPCSSID=?	(display range of valid parameter settings using format **(0-65535)** to indicate that each n may take on values in the range)

Description

Returns or sets a preferred list of System Identification Numbers (SIDs) for circuit-switched CDPD. If this list has any entries, the modem will attempt to register preferentially with service providers broadcasting an SID matching one of the list entries, preferring SIDs closer to the beginning of the list. If the list is empty, the modem will ignore the broadcast SID when selecting a service provider with which to register. The list is represented by a series of SID values separated by commas. The list can be made empty by entering **+WPCSSID=**<CR> or **+WPCSSID=0**<CR> removing the requirement for finding a matching SID before registering. The length of the list is implementation dependent.

Defined Values

Each **n1-nx** is an integer with a range of 1-65535. The value 0 has special meaning as described above.

Implementation

Implementation of this command is optional. The number of SIDs supported is implementation specific but a minimum of 10 entries is suggested.

1.8.11 Configure Network Entity Identifiers (NEI)

Syntax

+WPNEI=<IP_Spec>[**,**<gmid>]
(set NEI indexed by **+WS197**)

+WPNEI? (display current NEI using format
<IP_Spec>,<gmid>
where IP_Spec is replaced by the current value of the NEI indexed by **+WS197**, displayed according to Section 1.5.1, and <gmid> is the associated GMID displayed in decimal)

+WPNEI=? **(**display range of valid parameter settings
"(address),(A,B,M,S)",(0),(138,142),(0-65535)
or similar output in accordance with TIA-615 and Section 1.5.1 of this Annex)

Description

Sets or returns the NEI indexed by **+WS197** used for point-to-point, multi-cast, broadcast, or allcast operation at the IP layer in the CDPD WDS protocol stack of the DCE.

IP_Spec — As defined in section 1.5.1. The value of the <port> subparameter of the IP_Spec is ignored. The only valid value for the <port> subparameter of the IP_Spec is **0** for this command.

gmid — An optional 16-bit GMID (Group Membership Identifier) for multi-cast addresses.

Examples of command format:

+WPNEI="ddd**.**ddd**.**ddd**.**ddd**"**	Stores the specified IPv4 address as a point-to-point address **ddd.ddd.ddd.ddd** at the NEI location defined by **+WS197**
+WPNEI="xxxx**:**xxxx**::**xxxx**:**xxxx**,M",,138,**n	Stores the specified IPv6 address as a multi-cast address with the 16 bit GMID **n** at the NEI location defined by **+WS197**, n is a decimal number with range (0-65535).
+WPNEI="ddd**.**ddd**.**ddd**.**ddd**,B"**	Stores the specified IPv4 address as a broadcast address **ddd.ddd.ddd.ddd** at the NEI location defined by **+WS197**.

Returns **ERROR** if the user enters unsupported <modifier_part> or <port> value.

Implementation

Implementation of this command is mandatory. Support for the <modifier_part> values A (anycast), M (multi-cast) and B (broadcast), and the number of NEIs supported, are optional and implementation dependent.

1.8.12 List All Network Entity Identifiers

Syntax

+WPNEILIST	(display the NEI list)
+WPNEILIST?	(not allowed - returns **ERROR**)
+WPNEILIST=?	(return **OK**)

Description

List all valid IP addresses used for point-to-point, multi-cast or broadcast operation at the IP layer in the CDPD WDS communication protocol stack of the DCE.

Response

<index> <IP_Spec> <reg status> <gmid> <autoreg NEI indicator>
OK or **0**

where:

index	The NEI location index in the modem (**+WS197**)
IP_Spec	As defined in Section 1.5.1. The value of the <port> subparameter of the IP_Spec is always displayed as **0**.
gmid	The 16-bit GMID (Group Membership Identifier) for multi-cast addresses displayed in decimal. For all other address types, this field is omitted or displayed as at least one blank. If the IP_Spec corresponds to the auto-registration point-to-point NEI, this field must be displayed as at least one blank (IA5 Hex 20).
reg status	Indicates the registration status of the NEI (**REG** for registered,or **NO** for not registered).
autoreg NEI indicator	A value of ***** for the autoreg NEI indicator identifies the auto-registration point-to-point NEI, if any, indexed by **+WS176**. Otherwise this field is omitted or displayed as at least one blank (IA5 Hex 20).

For example, one possible response to the command **AT+WPNEILIST** for a DCE with two IPv4 station NEIs and one IPv6 multicast NEI is:

```
1   “012.012.012.012,S”            REG  *
2   “123.123.123.123,S”            NO
3   “3333:3333::1111:1111,M”,,138  REG  65535
OK
```

Spacing between fields (e.g. between **REG** and *****) is implementation); displayed fields must be separated by at least one blank (IA5 Hex 20) ; capitalization, punctuation, and spacing within fields shall exactly match this standard.

Implementation

Implementation of this command is mandatory. The <modifier_part> values A (anycast), M (multi-cast) and B (broadcast) and the number of NEIs supported are implementation dependent.

1.8.13 **Deregister NEI From Network**

Syntax

+WPDEREG	(deregister the NEI indexed by **+WS197**)
+WPDEREG?	(not allowed - returns **ERROR**)
+WPDEREG=?	(return **OK**)

Description

Deregister the NEI indexed by **+WS197** from the CDPD WDS and return **OK** or **0** (numeric).

Implementation

Implementation of this command is mandatory

1.8.14 Register NEI to Network

Syntax

+WPREG	(attempt to register the NEI indexed by +WS197)
+WPREG=?	(not allowed - returns **ERROR**)
+WPREG=?	(return **OK**)

Description

Attempt to register the NEI indexed by **+WS197** on the CDPD network and then return one of the registration status information texts shown in the table below followed by **OK** or **0** (numeric). The setting of **+WS179** shall determine if the DCE shall wait for the registration to complete or immediately return **PENDING** followed by **OK** or **0**. The time to wait, if any, for successful registration is defined by **+WS198.** The response for unsuccessful registrations that result from the expiration of time out timer shall be **TIMEOUT_EXPIRED** followed by **OK** or **0**.

REGISTERED
PENDING
TIMEOUT_EXPIRED
DENIED_NO_REASON
DENIED_MDIS_INCAPABLE
DENIED_NEI_NOT_AUTHORIZED
DENIED_INSUFFICIENT_CREDENTIALS
DENIED_UNSUPPORTED_CREDENTIALS
DENIED_NEI_EXCEEDED_USAGE
DENIED_THIS_SUBNETWORK

Implementation

Implementation of this command is mandatory

1.8.15 **Ping**

Syntax

+WPPING=<IP_Spec>[[**,**<time-out>][**,**<size>]]	(initiate a Ping)
+WPPING?	(not allowed - returns **ERROR**)
+WPPING=?	(display range of valid parameter settings **"(address),(S)",(0),(138,142),(0-**t**),(1-**s**)** or similar output in accordance with TIA-615 and Section 1.5.1 of this Annex, where *t* is replaced by the maximum time-out supported, and *s* is replaced by the maximum size supported)

Description

Ping the specified IP address using the internal TCP/IP stack in the DCE. A 29-228 byte ping packet (ICMP Echo Request), comprised of the specified number of bytes of ping data, 8 bytes of ICMP header and 20 bytes of IP header is generated and sent to the IP host with the specified address.

For example, **AT+WPPING="**ddd**.**ddd**.**ddd**.**ddd**"** returns one of the following responses:

If successful:

Valid Response Elapsed time: ddddd **ms**
OK or **0**

If not successful:

Unable to send PING or
Time-out Elapsed Time: ddddd or
Invalid Response (Bad Type) or
Invalid Response (Bad Checksum) or
Invalid Response (Bad Id) or
Invalid Response (Bad Sequence) or
Destination Unreachable
ERROR or **4**

Defined Values

IP_Spec	As defined in section 1.5.1. The use of the optional <port> and <modifier_part> subparameters are ignored for this command
time-out	The time in seconds to wait for the ping response before reporting a time-out failure. If it is not specified the default value is 5 seconds.
size	The desired size of the ping data from 1-200 bytes or optionally 29-1472 bytes. The default is 200.

Implementation

Implementation of this command is optional, however, it is highly desirable to provide this feature for debugging network and protocol stack problems.

If the modem provides the capability to send pings, then support for 1-200-bytes of ping data is required and support for 201-1472 bytes of ping data is optional.

1.8.16

Display Connection Information for CS-CDPD

Syntax

+WPCSINFO	(display Circuit Switched status information)
+WPCSINFO?	(not allowed - returns **ERROR**)
+WPCSINFO=?	(return **OK**)

Description

Display Circuit Switched CDPD connection information. When a connection is not established, some fields may return NA indicating they are not applicable.

+**WPCSINFO** returns a multi-line list of Circuit Switched CDPD connection information. Note that only current valid status for each descriptor is returned as shown in the example.

Status	**Descriptor**
NO	**CONNECTION**
CONNECTION_ddddd	
NA	**DIAL CODE**
<LAST_DIAL_CODE>	
NA	**SID**
dddd	
NA	**SIDE**
A or **B**	
NA	**CHANNEL**
dddd	
-ddd	**RSSI**
CSDIALING	**CHANNEL STATE**
CSREDIALING	
CSANSWERING	
CSCONNECTED	
CSSUSPENDED	
NOT_AVAILABLE	
<optional info text, any # lines>	
OK or **0**	

d represents a decimal value

One example response to **AT+WPCSINFO** would be:

CONNECTION_14400	**CONNECTION**
619-555-1212	**DIAL CODE**
21034	**SID**
A	**SIDE**
1023	**CHANNEL**
-85	**RSSI**
CSCONNECTED	**CHANNEL STATE**
OK	

Spacing between fields (e.g. between CSCONNECTED and CHANNEL STATE) is implementation dependent; fields must be separated by at least one blank (ASCII / IA5 Hex 20); capitalization and spacing within fields (e.g. the single space between capitalized **CHANNEL** and **STATE**) shall exactly match this standard.

Returns only **ERROR** if the current CDPD service type is not one of the Circuit Switched CDPD types as indicated by **+WPSERVICE?**.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.8.17 **Display Electronic Identification (EID)**

Syntax

+WPEID	(display DCEs EID)
+WPEID?	(not allowed - returns **ERROR**)
+WPEID=?	(return **OK**)

Description

Display the CDPD Electronic ID of the DCE presented as six decimal numbers separated by periods (ddd**.**ddd**.**ddd**.**ddd**.**ddd**.**ddd) where ddd is a decimal number 0-255. The display of leading zero values is optional.

Implementation

Implementation of this command is mandatory.

1.8.18 Select Channel

Syntax

+WPCHAN=<nnnn>	(set the channel)
+WPCHAN?	(display the current channel setting)
+WPCHAN=?	(display the range of channels available, 0-1023)

Description

Set the DCE to use only the specified channel (1-1023). When **0** is specified, the DCE shall resume automatic channel selection. The default value (**0**) shall be restored at DCE power up.

Defined Values

0	Automatic Channel Selection (Default)
1 - 1023	User Selected Channel

Implementation

Implementation of this command is optional and is only applicable for those DCEs that support Packet Switched CDPD per **+WPSERVICE=?.**

1.8.19 **Display RSSI/Channel State**

Syntax

+WPRSSI	(display DCE RSSI, Channel State, and registration state)
+WPRSSI?	(not allowed - returns **ERROR**)
+WPRSSI=?	(return **OK**)

Description

Query the DCE for current RSSI, Channel State, channel, and registration status for the NEI indexed by **+WS197**.

Response

+WPRSSI returns only the numeric formatted responses identified below:

-nnn,s,r,c

where:

-nnn is the Received Signal Strength in dBm (-113 to -53)
s is the numeric Channel State as shown in the table below
r is the registration status (1=registered, 0= not registered) of the NEI indexed by **+WS197**
c is the CDPD/AMPS channel number 1-1023

Channel State	Response
Not Available	**0**
Scanning	**1**
Initial Acquire	**2**
Acquired	**3**
Sleeping	**4**
Waking	**5**
CS Dialing	**6**
CS Redialing	**7**
CS Answering	**8**
CS Connected	**9**
CS Suspended	**10**

OK or **0**

Implementation

Implementation of this command is mandatory. Additional range for display of RSSI beyond the minimum required is implementation dependent.

1.8.20 **Display Registration State**

Syntax

+WPREGSTATE	(display DCE registration state)
+WPREGSTATE?	(not allowed - returns **ERROR**)
+WPREGSTATE=?	(return **OK**)

Description

Query the DCE for registration status for the NEI indexed by **+WS197**.

+WPREGSTATE returns one of the responses listed below:

DCE Registered on CDPD Network	**REGISTERED** **OK** or **0**
DCE Not Registered on CDPD Network	**NO** **OK** or **0**

Implementation

Implementation of this command is mandatory

1.8.21 **Configure CS-CDPD NAM**

Syntax

+WPNAM=MIN**,**SID**,**SYS[**,**IPC**,**FCA**,**FCB**,**LCA**,**LCB**,**DTM**,**DT]	(Configure NAM indexed by +WS178)
+WPNAM?	(Display MIN, SID, and SYS of NAM indexed by +WS178)
+WPNAM=?	(Display valid settings)

Description

Sets or returns Number Assignment Module (NAM) indexed by **+WS178** to be used for AMPS operation in CS-CDPD mode. The **+WPNAM** command requires the Mobile Identification Number (MIN), System Identification (SID), and the AMPS System Preference (SYS) sub-parameters and can accept the optional sub-parameters listed below.

Defined Values

MIN	A standard 10 digit North American Number Plan number e.g. 1235551212.
SID	The AMPS Home System ID for this NAM. A decimal integer in the range (0-32767)
SYS	The Side Preference 0 = A Only, 1 = B Only, 2 = A Preferred, 3 = N Preferred, 4 = Home Only default = B Preferred if even SID, A Preferred if odd SID

The following sub-parameters are optional, if none are included, the default values take effect. If any of these sub-parameters are included then all values must be specified, even if they are the defaults.

IPC	Initial paging channel. A decimal integer in the range (1 - 1023) default=334 if even SID, 333 if odd SID
FCA	First control channel for system A. A decimal integer in the range (1 - 1023) default=333
FCB	First control channel for system B. A decimal integer in the range (1 - 1023) default=334
LCA	Last control channel for system A. A decimal integer in the range (1 - 1023) default=313
LCB	Last control channel for system B. A decimal integer in the range (1 - 1023) default=354

DTM	The Station Class Mark power DTX mode 0=Continuous (default), 1=Discontinuous
DT	The discontinuous transmission option 0=DISABLE (default), 1=ENABLE

The output of **+WPNAM?** is formatted according to TIA-615 rules for parameter commands.

Implementation

Implementation of this command is mandatory for DCE that support Circuit Switched CDPD per **+WPSERVICE=?**. and must include MIN,SID,SYS. The implementation of all other sub-parameters is optional, but if implemented must be implemented as a complete group. **+WPNAM=?** may be used to determine which parameters are implemented, as enumerated in TIA 615. If the DCE is incapable of programming a NAM, i.e. does not contain a radio, it will respond with **ERROR** or **4** to the **+WPNAM=?** command.

1.8.22 **Display Current Point-to-Point NEI**

Syntax

+WPCURNEI	(display the current point-to-point NEI, using the <address> format defined in Section 1.5.1, with no <modifier_part>)
+WPCURNEI?	(not allowed - returns **ERROR**)
+WPCURNEI=?	(return **OK**)

Description

Display the current point-to-point NEI. This command allows protocol stacks connected to the DCE to dynamically request and configure the stack to match to the DCE IP address.

The **+WPCURNEI** command displays the NEI indexed by **+WS176**; in the special case that **+WS176=0**, **+WPCURNEI** displays the NEI indexed by **+WS197**. This NEI may correspond to either an IPv4 or an IPv6 address. The address type may be determined by examining the output; output containing colons represents an IPv6 address, while all other output represents an IPv4 address.

Response (for IPv4 address)

"ddd**.**ddd**.**ddd**.**ddd**"**
OK or **0**

Where ddd**.**ddd**.**ddd**.**ddd is a four part standard IP address. Each field designated ddd consists of 1 to 3 decimal digits in the range 0-255. Leading zeros are permitted but not required. Addresses consisting of all zeros and all ones not allowed.

Representative Response (for IPv6 address)

"hhhh**::**hhhh**:**hhhh**:**hhhh**"**
OK or **0**

Where each hhhh represents 16 bits of address information represented in hexadecimal, as 1 to 4 hex digits in the range 0-FFFF. Leading zeros are permitted but not required. Addresses consisting of all zeros and all (binary) ones not allowed.

Implementation

Implementation of this command is optional.

1.8.23

Display Supported Annex L Commands

Syntax

+WCXL	**(display the supported commands from Annex L)**
+WCXL?	(not allowed - returns **ERROR**)
+WCXL=?	**(returns OK)**

Description

Displays the commands in Annex L supported by the DCE.

When the DTE invokes this action (via **+WCXL**) the DCE must output the names of implemented commands. Each name will be delimited by double quotes, the quoted strings being separated by commas. The list includes the names of all supported Annex L commands, with the exception of **+WCXL** itself which is not reported. The output may occupy multiple lines, following TIA-615 rules for information text.

For example, a DCE operating in verbose mode and supporting only the **+WPSTATE** and **+WS173** commands (besides **+WCXL**) would respond to **+WCXL** with:

"+WPSTATE","+WS173"<end-of-info-text delimiter, e.g. CR/LF>
OK<delimiter>

+WCXL=? behaves according to TIA-615 rules for action commands having no sub-parameters.

Implementation

Implementation of this command is mandatory if any commands defined in this Annex are implemented.

1.9 Commands with S-register Syntax

The following commands define an extension to the PCCA STD-101 command set for use in the CDPD WDS mode of the DCE. The primary purpose of these additions is to have a common standard for implementation of DCEs supporting the CDPD WDS. The commands have pseudo **S**-register syntax (using the **+WS**xxx naming convention introduced in PCCA STD-101). Command set extensions with CDPD-specific syntax are listed in Section 1.8.

The *parameter visibility* and *parameter volatility* for each of these commands is manufacturer-specific (see PCCA STD-101, Section 3.8 and Section 5.4).

Implementor Note - DCEs which return only **"PACKET"** in response to a **+WPSERVICE=?** command, are not required to support the mandatory Circuit Switched CDPD unique commands: **+WS178, +WS183** through **+WS195**. Conversely, DCEs which do not return a **"PACKET"** in response to a **+WPSERVICE=?**, are not required to support the mandatory Packet Switched CDPD unique commands: **+WS174**, **+WS175**.

1.9.1 Registration Control

Syntax

+WS173=<n>	(set registration control mode)
+WS173?	(display current registration control mode)
+WS173=?	(display valid registration control modes)

Description

Defines the mode by which the DCE will register with the CDPD network. The NEI to be used for registration is controlled by registers **+WS176** and **+WS197.**

Defined Values for n

0	Attempt to register only after **+WPREG** or **ATD** commands
1	Attempt to register automatically upon entry into CDPD WDS mode
2	Attempt to register automatically when data is received from the DTE or after **+WPREG** or **ATD**.

Implementation

Implementation of this command is mandatory for n=**0** and n=**1**.

1.9.2 **Scan Preference**

Syntax

+WS174=<n>	(set scan preference)
+WS174?	(display scan preference)
+WS174=?	(display valid scan preferences)

Description

Defines the preferred side (A or B) as the starting point for wide area scans for channel acquisition on the CDPD network.

Defined Values for n

0	No preference (default)
1	Scan A side first
2	Scan B side first
3	A Side Only (Test)
4	B Side Only (Test)

Implementation

Implementation of this command is optional and is only applicable for those DCEs that support Packet Switched CDPD per **+WPSERVICE=?**. If implemented, then n=**0**, n=**1**, and n=**2** are required.

1.9.3 **CDPD Sleep Idle Time**

Syntax

+WS175=<n>	(set the sleep idle time)
+WS175?	(display the current sleep idle time)
+WS175=?	(display valid sleep idle-time settings)

Description

Number of seconds idle before allowing DCE to enter CDPD sleep. Reference: CDPD Idle Timer T203. Note at this idle time before the CDPD is allowed to go into CDPD network sleep and should not be confused with other power saving sleep modes.

Defined Values for n

0	disable CDPD sleep
10-**3600**	seconds idle before sleeping

Implementation

Implementation of this command is mandatory for DCEs that support Packet Switched CDPD per **+WPSERVICE=?**.

1.9.4 Auto-Registration NEI Index

Syntax

+WS176=<n>	(set automatic registration NEI index)
+WS176?	(display current automatic registration NEI index setting)
+WS176=?	(display valid automatic registration NEI index range)

Description

Defines the NEI to be used for automatic registration to the CDPD network as determined by **+WS173**. A non-zero value is the index into the DCEs NEI list pointing to the NEI to be automatically registered. A zero value requires that the NEI indexed by **+WS197** be used.

Defined Values for n

0	Attempt to register automatically using NEI indexed by **+WS197**
n	Attempt to register automatically using NEI indexed by n

Implementation

Implementation of this command is optional. If this register is not implemented, then **+WS197** is used to identify the NEI used for automatic registration.

1.9.5 **Destination Address Selection**

Syntax

+WS177=<n>	(set the Destination IP Address selection index)
+WS177?	(display the current Destination IP Address selection index)
+WS177=?	(display valid selection values)

Description

Selection index for the destination IP address of the Remote End System for use with the **ATD** command when **+WS45=0** or **+WS45=1** (DTE-side stack is transparent character stream), or any other single-endpoint +WS45 setting is in effect, and no destination address is specified in the dial string. The number of IP addresses supported by the DCE determines the maximum value of **n**.

Defined Values

0	Do not use predefined End System address
1	Use first stored End System address
2	Use second stored End System address
n	Use nth stored End System address

Implementation

Implementation of this command is optional. The number of destination IP addresses supported is implementation specific.

1.9.6 **CS-CDPD NAM Index**

Syntax

+WS178=<n>	(set CS-CDPD NAM index)
+WS178?	(display current CS-CDPD NAM index)
+WS178=?	(display valid NEI index settings)

Description

Selects the NAM to be used in CS-CDPD mode by **ATD** and **+WPNAM** commands.

Defined Values for <n>

1 - n NAM selection where n is the maximum number of NAMs supported by the DCE.

Implementation

Implementation of this command for n=**1** is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**. The maximum number of NAMs supported is implementation specific.

1.9.7 **On-line Control Preference**

Syntax

+WS179=<n>	(set on-line control preference)
+WS179?	(display on-line control preference)
+WS179=?	(display range of valid parameter settings)

Description

Determines if **ATD** or **WPREG** command will result in DCE immediately going into on-line state without waiting for network registration or if it will wait for registration based on the time-out in **+W198**.

Defined Values for n

0	go into on-line state upon **ATD** or **WPREG**
1	wait for registration or time-out of **+WS198**

Implementation

Implementation of this command is mandatory.

1.9.8 **Acquisition Failure Sleep Timer**

Syntax

+WS180=<n>	(set sleep timer)
+WS180?	(display current sleep timer setting)
+WS180=?	(display valid sleep timer settings)

Description

Number of seconds DCE waits before going into power conservation mode if no channel is available.

Defined Values for n

0	don’t go into power conservation mode
10 - **255**	seconds until sleep if no channel is available

Implementation

Implementation of this command is optional.

1.9.9 **Service Preference**

Syntax

+WS181=<n>	(set service preference)
+WS181?	(display current service preference setting)
+WS181=?	(display valid service preference settings)

Description

Defines the CDPD service preference for the DCE.

Defined Values for <n>

0	Always use packet switched CDPD
1	Always use circuit switched CDPD via AMPS
2	Always use circuit switched CDPD via PSTN
3	Use circuit switched CDPD via AMPS only when packet switched CDPD is not available
4	Use packet switched CDPD only when circuit switched CDPD is not available
5-10	Reserved for implementation specific criteria.

Implementation

Implementation of this command is mandatory however, the service preferences supported are implementation specific. **+WS181=?** shall return a list of those preference values supported in accordance with the requirements of TIA-615.

1.9.10 TCP Header Compression (Informative)

The interim version of this standard, PCCA XANX-101 L, included a command +WS182 to control TCP header compression. The +WS182 command to control header compression is no longer part of this standard.

On the DTE-DCE link, TCP Header compression may be controlled using various techniques, including but not limited to any of the following:

Method	**Description**
None	When using SLIP (+WS45=3) on the DTE-DCE link, the DCE manufacturer may elect to forbid the use of TCP or UDP header compression.
Smart	When using SLIP on the DTE-DCE link, the DCE manufacturer may implement algorithms to automatically detect and adapt to the use of Compressed SLIP (CSLIP).
Proprietary	The DCE manufacturer may implement proprietary AT commands or other means to explicitly determine whether CSLIP or SLIP is used when +WS45=3.
Explicit	The DCE manufacturer may implement PCCA-approved +WS45 settings that select SLIP (no compression), smart SLIP/CSLIP (compress if compressed data is received), or CSLIP (always compress). *+WS45 settings for explicit control of CSLIP were approved by the PCCA Modem Standards Committee in January, 1998 for incorporation into PCCA STD-101. Contact the PCCA for assistance if you are unable to obtain a version of PCCA STD-101 dated later than January, 1998.*
Negotiated	When using PPP (+WS45=4), the use of header compression on the DTE-DCE link is negotiated by the PPP drivers.

On the CDPD airlink, the CDPD standard governs negotiation and implementation of TCP header compression. Proprietary mechanisms for control of airlink TCP header compression, or for adaptation of the airlink compression setting to the DTE-DCE link compression setting, are not governed by the CDPD standard or by PCCA STD-101 Annex L.

1.9.11 CS-CDPD Initial Call Retry Limit

Syntax

+WS183=<n>	(set retry limit)
+WS183?	(display current retry limit)
+WS183=?	(display valid retry limit settings)

Description

The number of times to retry an initial call attempt due to a failure to successfully establish a call connection. Reference: CS-CDPD Implementor Guidelines, Retry Limit N401.

Defined Values for n

0 - 5	retries

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.12 **CS-CDPD Connection Request Retry Limit**

Syntax

+WS184=<n>	(set retry limit)
+WS184?	(display current retry limit)
+WS184=?	(display valid retry limit settings)

Description

The number of times to resend a Connection Request due to a non-receipt of a Connection Response. Reference: CS-CDPD Implementor Guidelines, Retry Limit N402.

Defined Values for n

0 - **20**	retries.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.13 **CS-CDPD Reconnection Request Retry Limit**

Syntax

+WS185=<n>	(set retry limit)
+WS185?	(display current retry limit)
+WS185=?	(display valid retry limit settings)

Description

The number of times to resend a Reconnection Request due to a non-receipt of a Reconnection Response. Reference: CS-CDPD Implementor Guidelines, Retry Limit N403

Defined Values for n

0 - **20**	retries.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.14 CS-CDPD Link Reset Request Retry Limit

Syntax

+WS186=<n>	(set retry limit)
+WS186?	(display current retry limit)
+WS186=?	(display valid retry limit settings)

Description

The number of times to send a Link Reset due to non-receipt of a Link Reset Acknowledge. Reference: CS-CDPD Implementor Guidelines, Retry Limit N404

Defined Values for n

0 - **10**	retries.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.15 CS-CDPD Reconnection Call Retry Limit

Syntax

+WS187=<n>	(set retry limit)
+WS187?	(display current retry limit)
+WS187=?	(display valid retry limit settings)

Description

The number of times to retry a reconnection call attempt due to a failure to successfully establish a call connection. Reference: CS-CDPD Implementor Guidelines, Retry Limit N405

Defined Values for n

0 - 5	retries.

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.16 CS-CDPD Receive Timer

Syntax

+WS188=<n>	(set timer)
+WS188?	(display current timer)
+WS188=?	(display valid timer settings)

Description

The amount of time the modem must wait for a Connection Request or a Reconnection Request once a physical connection is established by the CMD-IS.

Defined Values for n

0 - **30**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.17 **CS-CDPD Connection Response Timer**

Syntax

+WS189=<n>	(set timer)
+WS189?	(display current timer)
+WS189=?	(display valid timer settings)

Description

The maximum amount of time a modem will wait for a Connection Response after sending a Connection Request.

Defined Values for n

0 - **15**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.18 **CS-CDPD Reconnection Response Timer**

Syntax

+WS190=<n>	(set timer)
+WS190?	(display current timer)
+WS190=?	(display valid timer settings)

Description

The maximum amount of time a modem will wait for a Reconnection Response after sending a Reconnection Request.

Defined Values for n

0 - **15**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.19 **CS-CDPD Disconnect Timer**

Syntax

+WS191=<n>	(set timer)
+WS191?	(display current timer)
+WS191=?	(display valid timer settings)

Description

The maximum amount of time to wait for a call to be released after an action that should result in the call being released.

Defined Values for n

0 - **15**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.20 **CS-CDPD Inactivity Timer**

Syntax

+WS192=<n>	(set timer)
+WS192?	(display current timer)
+WS192=?	(display valid timer settings)

Description

The maximum time an active session is maintained by the modem in the absence of any SNDCP traffic.

Defined Values for n

0 - **65535**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.21 CS-CDPD Link Reset Acknowledge Timer

Syntax

+WS193=<n>	(set timer)
+WS193?	(display current timer)
+WS193=?	(display valid timer settings)

Description

The maximum amount of time to wait for a Link Reset Acknowledge once a Link Reset has been sent.

Defined Values for n

0 - **15**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.22 **CS-CDPD Reconnection Retry Timer**

Syntax

+WS194=<n>	(set timer)
+WS194?	(display current timer)
+WS194=?	(display valid timer settings)

Description

The maximum amount of time to wait before attempting to dial the CMD-IS again after a call failure during reconnection.

Defined Values for n

0 - **15**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.23 **CS-CDPD Connection Retry Timer**

Syntax

+WS195=<n>	(set timer)
+WS195?	(display current timer)
+WS195=?	(display valid timer settings)

Description

The maximum amount of time to wait before attempting to dial the CMD-IS again after a call failure during connection.

Defined Values for n

0 - **15**	seconds

Implementation

Implementation of this command is mandatory for those DCEs that support Circuit Switched CDPD per **+WPSERVICE=?**.

1.9.24 **Data Compression**

Syntax

+WS196=<n>	(set data compression enable)
+WS196?	(display current data compression enable)
+WS196=?	(display valid data compression enable settings)

Description

SNDCP V42bis Data compression enable.

When V.42bis compression is enabled, the DCE may respond to **+I**xx and **+D**x commands from V.25ter or similar standards, and may report intermediate result codes related to data compression during processing of dial and answer operations; such behavior is implementation-specific and not required for compliance with this standard.

Defined Values for n

0	V42bis Compression disabled
1	V42bis Compression enabled

Implementation

Implementation of this command is optional.

1.9.25 **NEI Index**

Syntax

+WS197=<n>	(set NEI index)
+WS197?	(display current NEI index)
+WS197=?	(display valid NEI index settings)

Description

Selects the NEI acted on by **+WPNEI**, **+WPREG**, and **+WPDEREG** commands. If **+WS176=0**, **+WS197** also determines the auto-registration NEI.

Defined Values for n

1 - n NEI selection where n is the maximum number of NEIs supported by the DCE.

Implementation

Implementation of this command is mandatory for n=**1**. The maximum number of NEIs is implementation specific.

1.9.26 **Registration Wait Time**

Syntax

+WS198=<n>	(set registration wait time)
+WS198?	(display current registration wait time)
+WS198=?	(display valid registration wait time settings)

Description

Set the Registration Wait time-out timer for the **ATD** and **+WPREG** commands. This time is similar in operation to the Connection Completion Time-Out (**S7**) described in STD-101 in allowing a fixed delay during network registration before timing out.

Defined Values for n

1 - **255**	seconds

Implementation

Implementation of this command is mandatory.

1.9.27 **Acquisition Persistence**

Syntax

+WS199=<n>	(set acquisition persistence)
+WS199?	(display current acquisition persistence)
+WS199=?	(display valid acquisition persistence settings)

Description

Defines the persistence of the modem in attempting to acquire before declaring failed acquisition. **+WS199** may be used in conjunction with **+WS180**, Acquisition Failure Sleep Timer to conserve power when the DCE is outside system coverage.

Defined Values for n

0	don't give up
1	high persistence
2	medium persistence
3	low persistence

Implementation

Implementation of this command is optional. The definition of high, medium, and low persistence are implementation dependent.