LZR®-VISIOSCAN RD

Communication Protocol

V1.0

Version History

Version	Date	Comment
V1.0	20/10/2023	Document release.

Table of Contents

1 Introduction 3
1.1 Scope 3
1.2 Definitions, acronyms and abbreviations 3
1.3 Presentation of LZR®-VISIOSCAN RD 3
2 Hardware interface 4
2.1 Ethernet communication characteristics 4
2.2 Wiring diagram 4
3 Ethernet communication protocol 5
3.1 Command Formats 5
3.1.1 Binary protocol 5
3.1.2 ASCII protocol 5
3.2 Data types of variables 6
3.3 Example and explanation 6
4 Commands 7
4.1 Request for MDI 7
4.1.1 Command: Start to send MDI 7
4.1.2 Command: Stop to Send MDI 8
4.2 Read out 9
4.2.1 Command: Get IP 9
4.2.2 Command: Get gateway 10
4.2.3 Command: Get subnet mask 11
4.2.4 Command: Get protocol 12
4.2.5 Command: Get port 13
4.2.6 Command: Get MDI data packet type 14
4.2.7 Command: Get angular resolution 15
4.2.8 Command: Get MDI data output direction 16
4.2.9 Command: Get angle range 17
4.2.10 Command: Get skip spots 18
4.2.11 Command: Get contamination threshold 19
4.2.12 Command: Get contamination state 20
4.2.13 Command: Get version 21
4.2.14 Command: Get internal temperature 22
4.2.15 Command: Get error log 23
4.2.16 Command: Get LED control 26
4.2.17 Command: Get lamp state 27

4.2.18 Command: Get Ethernet configuration 29
4.2.19 Command: Get hours 30
4.2.20 Command: Get device name 31
4.2.21 Command: Get window calibration status 32
4.2.22 Command: Get filter status 33

4.3 Configurate 34

4.3.1 Command: Set IP 34
4.3.2 Command: Set gateway 35
4.3.3 Command: Set subnetmask 36
4.3.4 Command: Set protocol 37
4.3.5 Command: Set port 38
4.3.6 Command: Set MDI data packet type 39
4.3.7 Command: Set angular resolution 40
4.3.8 Command: Set MDI data output direction 41
4.3.9 Command: Set angle range 42
4.3.10 Command: Set skip spots 43
4.3.11 Command: Set contamination threshold 44
4.3.12 Command: Reset 45
4.3.13 Command: Set LED control 46
4.3.14 Command: Set network indicator 47
4.3.15 Command: Reboot device 48
4.3.16 Command: Set ethernet configuration 49
4.3.17 Command: Set device name 51
4.3.18 Command: Set window calibration 52
4.3.19 Command: Set filter 53

4.4 MDI data packet 54

1 Introduction

1.1 Scope

This document specifies the communication protocol for the data output via the Ethernet interface of the LZR®-VISIOSCAN RD laser scanner, including UDP/IP and TCP/IP.

1.2 Definitions, acronyms and abbreviations

This subsection provides the definitions of all terms, acronyms, and abbreviations required to properly interpret this document.

- AGV: Automated Guided Vehicle
- MDI: Measured Distance Information
- MRI: Measured Remissions Information

1.3 Presentation of LZR®-VISIOSCAN RD

The LZR®-VISIOSCAN RD laser scanner is composed of a laser measurement head connected to a RPU module.

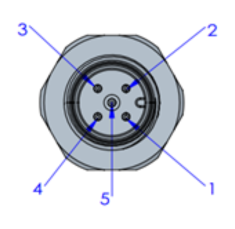
2 Hardware interface

2.1 Ethernet communication characteristics

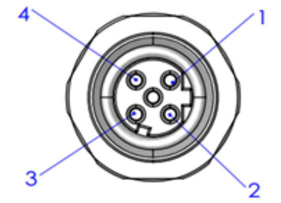
The device has Ethernet interface. The commands are transferred only via TCP/IP while the MDI data can be transferred via TCP/IP or UDP/IP.

2.2 Wiring diagram

A-CODE

	PN	DESIGNATION	COLOR
	1	Vin+	BROWN
	2	OUT1	WHITE
	3	GND	BLUE
	4	OUT2	BLACK
	5	NC	

D-CODE

	PN	DESIGNATION	COLOR
	1	TX+	YELLOW
	2	RX+	WHITE
	3	TX-	ORANGE
	4	RX-	BLUE

3 Ethernet communication protocol

3.1 Command Formats

There are two types of the command format: Binary and ASCII. Both types use Big endian.

3.1.1 Binary protocol

Binary communication frame			
Start	Length	DATA	CHK
6Bytes	2Bytes	N Bytes	1Byte

The binary protocol of the laser scanner has the format as the table shows and the command string can be converted from the ASCII commands described in this document. The binary protocol has a special framing so that the laser scanner can recognize the start of a binary telegram. The string must start with 2 STX symbols (02 02) and BE A0 12 34 that is followed by the length of the telegram in HEX (i.e.:00 0E). Then are the DATA zone. Last is the check sum.

Example:

Binary: 02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 49 50 20 C0 A8 01 01 49

Special Characters: Header: 02 02 BE A0 12 34; Length: 00 0E; Space: 20; Checksum: 49

The length can be created by counting every letter of the DATA (without checksum and framing but with blanks) and convert the sum into HEX (all dark blue area). Zeros are added in front until a string of eight characters is built. The command itself starts after the length characters. Every single letter of the written command is converted to HEX turning into a pair of numbers, followed by a blank and then the parameters also converted in HEX. In between parameters there are no blanks. The “Checksum” is built with XOR beginning the calculation right after the length (i.e. all dark blue area).

3.1.2 ASCII protocol

The framing of a telegram in ASCII is a <STX> at the start and an <ETX> at the end of each telegram. Commands are written as letters, followed by the parameters as defined in this document. There must be a blank in between the command and the parameters and also in between each parameter (as shown in the example below as_).

Example:

<STX>cWN_SetIP_192_168_1_1<ETX>

In HEX the command starts with 02 and ends with 03. The spaces are marked as 20.

HEX:

02 63 57 4E 20 53 65 74 49 50 20 31 39 32 20 31 36 38 20 31 20 31 03

(Both examples show the same command and parameters.)

3.2 Data types of variables

The following data types are specified for the variable values in the telegram:

Type	**Size(bits)**	**Range of Value(decimal)**	**Sign**
Uint8	8	0 ~ 255	unsigned
Int8	8	-128 ~ +128	signed
Uint16	16	0 ~ 65535	unsigned
Int16	16	-32768 ~ +32767	signed
Uint32	32	0 ~ 4294967295	unsigned
Int32	32	-2147483648 ~ +2147483647	signed
Enum8	8	0 ~ 255	unsigned
String	Depends on content		

3.3 Example and explanation

The different between the two kind of protocol is shown in the following table.

Description	Value ASCII	Value Hex	Value Binary
Start of text	<STX>	02	02 02 BE A0 12 34 + given length
End of text	<ETX>	03	Check sum
Command read by name	cRN	63 52 4E	63 52 4E
Command write by name	cWN	63 57 4E	63 57 4E
Response read command	cRA	63 52 41	63 52 41
Response write command	cWA	63 57 41	63 57 41
Space	{SPC}	20	20

The following table shows the example of different protocol

cWN SetIP 192 168 1 1	
ASCII	<STX>cWN{SPC}SetIP{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 49 50 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 49 50 20 C0 A8 01 01 49

4 Commands

4.1 Request for MDI

4.1.1 Command: Start to send MDI

Ask laser scanner to start to send MDI.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cWN SendMDI**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Start to send MDI	String	SendMDI

E.g:

cWN SendMDI	
ASCII	<STX>cWN{SPC}SendMDI<ETX>
HEX	02 63 57 4E 20 53 65 6E 64 4D 44 49 03
Binary	02 02 BE A0 12 34 00 0B 63 57 4E 20 53 65 6E 64 4D 44 49 26

Response

Command Syntax: **cWA SendMDI**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Start to send MDI	String	SendMDI

E.g:

cWA SendMDI	
ASCII	<STX>cWA{SPC}SendMDI<ETX>
HEX	02 63 57 41 20 53 65 6E 64 4D 44 49 03
Binary	02 02 BE A0 12 34 00 0B 63 57 41 20 53 65 6E 64 4D 44 49 29

4.1.2 Command: Stop to Send MDI

Ask laser scanner to stop to send MDI

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cWN StopMDI**

Command part	Description	Type	Value
Command type	Request	String	cWN
Command	Stop to send MDI	String	StopMDI

E.g:

cWN StopMDI	
ASCII	<STX>cWN{SPC}StopMDI<ETX>
HEX	02 63 57 4E 20 53 74 6F 70 4D 44 49 03
Binary	02 02 BE A0 12 34 00 0B 63 57 4E 20 53 74 6F 70 4D 44 49 22

Response

Command Syntax: **cWA StopMDI**

Command part	Description	Type	Value
Command type	Response	String	cWA
Command	Stop to send MDI	String	StopMDI

E.g:

cWA StopMDI	
ASCII	<STX>cWA{SPC}StopMDI<ETX>
HEX	02 63 57 41 20 53 74 6F 70 4D 44 49 03
Binary	02 02 BE A0 12 34 00 0B 63 57 41 20 53 74 6F 70 4D 44 49 2D

4.2 Read out

4.2.1 Command: Get IP

Query laser scanner for its local IP address.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetIP**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get IP address	String	GetIP

E.g:

cRN GetIP	
ASCII	<STX>cRN{SPC}GetIP<ETX>
HEX	02 63 52 4E 20 47 65 74 49 50 03
Binary	02 02 BE A0 12 34 00 09 63 52 4E 20 47 65 74 49 50 10

Response

Command Syntax: **cRA GetIP Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return the IP address	String	GetIP
Data	IP address	Uint8(4*)	0~255(4*)

E.g:

cRA GetIP 192 168 1 1	
ASCII	<STX>cRA{SPC}GetIP{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 49 50 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 49 50 20 C0 A8 01 01 57

4.2.2 Command: Get gateway

Query laser scanner for its gateway.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetGW**

Command part	Description	Type	Value
Command type	Request	String	cRN
Command	Get gateway	String	GetGW

E.g:

cRN GetGW	
ASCII	<STX>cRN{SPC}GetGW<ETX>
HEX	02 63 52 4E 20 47 65 74 47 57 03
Binary	02 02 BE A0 12 34 00 09 63 52 4E 20 47 65 74 47 57 19

Response

Command Syntax: **cRA GetGW Data**

Command part	Description	Type	Value
Command type	Response	String	cRA
Command	Return gateway	String	GetGW
Data	Gateway	Uint8(4*)	0~255(4*)

E.g:

cRA GetGW 192 168 1 1	
ASCII	<STX>cRA{SPC}GetGW{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 47 57 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 47 57 20 C0 A8 01 01 5E

4.2.3 Command: Get subnet mask

Query laser scanner for its subnet mask.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetMask**

Command part	Description	Type	Value
Command type	Request	String	cRN
Command	Get subnet mask	String	GetMask

E.g:

cRN GetMask	
ASCII	<STX>cRN{SPC}GetMask<ETX>
HEX	02 63 52 4E 20 47 65 74 4D 61 73 6B 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 4D 61 73 6B 3D

Response

Command Syntax: **cRA GetMask Data**

Command part	Description	Type	Value
Command type	Response	String	cRA
Command	Return subnet mask	String	GetMask
Data	Subnet mask	Uint8(4*)	0~255(4*)

E.g:

cRA GetMask 255 255 255 0	
ASCII	<STX>cRA{SPC}GetMask{SPC}255{SPC}255{SPC}255{SPC}0<ETX>
HEX	02 63 52 41 20 47 65 74 4D 61 73 6B 20 32 35 35 20 32 35 35 20 32 35 35 20 30 03
Binary	02 02 BE A0 12 34 00 10 63 52 41 20 47 65 74 4D 61 73 6B 20 FF FF FF 00 ED

4.2.4 Command: Get protocol

Query laser scanner for its MDI transmission protocol.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetProto**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get protocol type	String	GetProto

E.g:

cRN GetProto	
ASCII	<STX>cRN{SPC}GetProto<ETX>
HEX	02 63 52 4E 20 47 65 74 50 72 6F 74 6F 03
Binary	02 02 BE A0 12 34 00 0C 63 52 4E 20 47 65 74 50 72 6F 74 6F 5F

Response

Command Syntax: **cRA GetProto Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return protocol type	String	GetProto
Data	Protocol type	Enum8	0 - UDP 1 - TCP

E.g:

cRA GetProto 1	
ASCII	<STX>cRA{SPC}GetProto{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 50 72 6F 74 6F 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 50 72 6F 74 6F 20 01 71

4.2.5 Command: Get port

Query laser scanner for its /UDP port number. The port number is mainly used:

- To establish TCP communication channel with host
- To transfer MDI data for UDP or TCP channel of device

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetPort**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get port number	String	GetPort

E.g:

	cRN GetPort
ASCII	<STX>cRN{SPC}GetPort<ETX>
HEX	02 63 52 4E 20 47 65 74 50 6F 72 74 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 50 6F 72 74 30

Response

Command Syntax: **cRA GetPort Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return port number	String	GetPort
Data	Port number	Uint16	1024~ 65535

E.g:

	cRA GetPort 3050
ASCII	<STX>cRA{SPC}GetPort{SPC}3050<ETX>
HEX	02 63 52 41 20 47 65 74 50 6F 72 74 20 33 30 35 30 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 50 6F 72 74 20 0B EA FE

4.2.6 Command: Get MDI data packet type

Query laser scanner for its MDI data packet type, either to sending distance measurements only or sending both the distance measurements and the amplitude data of each measurement.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetPType**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get MDI data packet type	String	GetPType

E.g:

	cRN GetPType
ASCII	<STX>cRN{SPC}GetPType<ETX>
HEX	02 63 52 4E 20 47 65 74 50 54 79 70 65 03
Binary	02 02 BE A0 12 34 00 0C 63 52 4E 20 47 65 74 50 54 79 70 65 61

Response

Command Syntax: **cRA GetPType Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return MDI data packe type	String	GetPType
Data	MDI data packet type	Enum8	0 - Distance only 1 - Distance & intensity

E.g:

	cRA GetPType 0
ASCII	<STX>cRA{SPC}GetPType{SPC}0<ETX>
HEX	02 63 52 41 20 47 65 74 50 54 79 70 65 20 30 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 50 54 79 70 65 20 00 4E

4.2.7 Command: Get angular resolution

Query laser scanner for its angular resolution.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetResol**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get angular resolution	String	GetResol

E.g:

cRN GetResol	
ASCII	<STX>cRN{SPC}GetResol<ETX>
HEX	02 63 52 4E 20 47 65 74 52 65 73 6F 6C 03
Binary	02 02 BE A0 12 34 00 0C 63 52 4E 20 47 65 74 52 65 73 6F 6C 4E

Response

Command Syntax: **cRA GetResol Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return angular resolution	String	GetResol
Data	Angular resolution	Enum8	0 - 0.2°@80Hz 1 - 0.1°@40Hz

E.g:

cRA GetResol 1	
ASCII	<STX>cRA{SPC}GetResol{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 52 65 73 6F 6C 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 52 65 73 6F 6C 20 01 60

4.2.8 Command: Get MDI data output direction

Query laser scanner for its MDI data output direction.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetDir**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get MDI data output direction	String	GetDir

E.g:

	cRN GetDir
ASCII	<STX>cRN{SPC}GetDir<ETX>
HEX	02 63 52 4e 20 47 65 74 44 69 72 03
Binary	02 02 BE A0 12 34 00 0A 63 52 4e 20 47 65 74 44 69 72 56

Response

Command Syntax: **cRA SetDir Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Get MDI data output direction	String	GetDir
Data	MDI data output direction	Enum8	0 - Clockwise 1 - Counterclockwise

E.g:

	cRA GetDir 0
ASCII	<STX>cRA{SPC}SetDir{SPC}0<ETX>
HEX	02 63 52 41 20 47 65 74 44 69 72 20 30 03
Binary	02 02 BE A0 12 34 00 0C 63 52 41 20 47 65 74 44 69 72 20 00 79

4.2.9 Command: Get angle range

Query laser scanner for its scanning angle range (unit: 0.01 degree) of one complete scan.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetRange**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get angle range	String	GetRange

E.g:

	cRN GetRange
ASCII	<STX>cRN{SPC}GetRange<ETX>
HEX	02 63 52 4E 20 47 65 74 52 61 6E 67 65 03
Binary	02 02 BE A0 12 34 00 0C 63 52 4E 20 47 65 74 52 61 6E 67 65 56

Response

Command Syntax: **cRA GetRange Start Stop**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return angle range	String	GetRange
Start	Start angle	Int16	-4760~22760
Stop	Stop angle	Int16	-4760~22760

E.g:

	cRA GetRange -4750 22750
ASCII	<STX>cRA{SPC}GetRange{SPC}-4750{SPC}22750<ETX>
HEX	02 63 52 41 20 47 65 74 52 61 6E 67 65 20 2D 34 37 35 30 20 32 32 37 35 30 03
Binary	02 02 BE A0 12 34 00 11 63 52 41 20 47 65 74 52 61 6E 67 65 20 ED 72 58 DE 60

4.2.10 Command: Get skip spots

Query laser scanner for its skip spots between two successive output measurements.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetSkip**

Command part	Description	Type	Value
Command type	Request	String	cRN
Command	Get skip spots number	String	GetSkip

E.g:

cRN GetSkip	
ASCII	<STX>cRN{SPC}GetSkip<ETX>
HEX	02 63 52 4E 20 47 65 74 53 6B 69 70 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 53 6B 69 70 28

Response

Command Syntax: **cRA GetSkip Data**

Command part	Description	Type	Value
Command type	Response	String	cRA
Command	Return skip spots number	String	GetSkip
Data	Skip spots number	Uint16	0 ~ Max (Spot number)-1

E.g:

cRA GetSkip 10	
ASCII	<STX>cRA{SPC}GetSkip{SPC}10<ETX>
HEX	02 63 52 41 20 47 65 74 53 6B 69 70 20 31 30 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 53 6B 69 70 20 00 0A 0D

4.2.11 Command: Get contamination threshold

Query the laser scanner for its warning and error threshold percentage (%) value of the window contamination monitoring function.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetCont**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get contamination threshold	String	GetCont

E.g:

cRN GetCont	
ASCII	<STX>cRN{SPC}GetCont<ETX>
HEX	02 63 52 4E 20 47 65 74 43 6F 6E 74 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 43 6F 6E 74 3F

Response

Command Syntax: **cRA GetCont Warning Error**

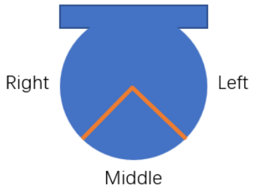
Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return contamination threshold	String	GetCont
Warning	Warning threshold	Uint8	0 ~ 100(%)
Error	Error threshold	Uint8	0 ~ 100(%)

E.g:

cRA GetCont 20 40	
ASCII	<STX>cRA{SPC}GetCont{SPC}20{SPC}40<ETX>
HEX	02 63 52 41 20 47 65 74 43 6F 6E 74 20 32 30 20 34 30 03
Binary	02 02 BE A0 12 34 00 0E 63 52 41 20 47 65 74 43 6F 6E 74 20 14 28 2C

4.2.12 Command: Get contamination state

Query laser scanner for its contamination state (percentage value in sequence as left>middle>right).



Supported Firmware

Prototype Number	P29 or higher

Request

Command Syntax: **cRN GetStat**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get contamination state	String	GetStat

E.g:

	cRN GetStat
ASCII	<STX>cRN{SPC}GetStat<ETX>
HEX	02 63 52 4E 20 47 65 74 53 74 61 74 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 53 74 61 74 3B

Response

Command Syntax: **cRA GetStat DataLeft DataMiddle DataRight**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return contamination status	String	GetStat
DataLeft	Contamination state of left zone	Uint8	0 ~ 100(%)
DataMiddle	Contamination state of middle zone	Uint8	0 ~ 100(%)
DataRight	Contamination state of right zone	Uint8	0 ~ 100(%)

E.g:

	cRA GetStat 10 20 30
ASCII	<STX>cRA{SPC}GetStat{SPC}10{SPC}20{SPC}30<ETX>
HEX	02 63 52 41 20 47 65 74 53 74 61 74 20 31 30 20 32 30 20 33 30 03
Binary	02 02 BE A0 12 34 00 0F 63 52 41 20 47 65 74 53 74 61 74 20 0A 14 1E 14

4.2.13 Command: Get version

Query laser scanner for its version information.

Supported Firmware

Prototype Number	P29 or higher

Request

Command Syntax: **cRN GetVer**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get version information	String	GetVer

E.g:

cRN GetVer	
ASCII	<STX>cRN{SPC}GetVer<ETX>
HEX	02 63 52 4E 20 47 65 74 56 65 72 03
Binary	02 02 BE A0 12 34 00 0A 63 52 4E 20 47 65 74 56 65 72 48

Response

Command Syntax: **cRA GetVer PartNumber HWversion SWversion SWrevision Prototype CAN ProductId**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return version information	String	GetVer
PartNumber	Product part number (BEA TOF)	Uint32	0 ~ 4294967295
HWversion	Hardware version	Uint8	0 ~ 255
SWversion	Software version	Uint8	0 ~ 255
SWrevision	Software revision	Uint8	0 ~ 255
Prototype	Software prototype	Uint8	0 ~ 255
CAN	BEA CAN number	Uint32	0 ~ 4294967295
ProductId	Product identification	Enum8	0: Undefined 47: RD

E.g:

cRA GetVer 20071100 0 1 0 2 3978456 47	
ASCII	<STX>cRA{SPC}GetVer{SPC}20071100{SPC}0{SPC}1{SPC}0{SPC}2{SPC}3978456{SPC}47<ETX>
HEX	02 63 52 41 20 47 65 74 56 65 72 20 32 30 30 37 31 31 30 30 20 30 20 31 20 30 20 32 20 33 39 37 38 34 35 36 20 34 37 03
Binary	02 02 BE A0 12 34 00 18 63 52 41 20 47 65 74 56 65 72 20 01 32 42 BC 00 01 00 02 00 3C B4 D8 20 2F D6

4.2.14 Command: Get internal temperature

Query laser scanner for its internal temperature (unit: 0.01℃).

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetTem**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get internal temperature	String	GetTem

E.g:

	cRN GetTem
ASCII	<STX>cRN{SPC}GetTem<ETX>
HEX	02 63 52 4E 20 47 65 74 54 65 6D 03
Binary	02 02 BE A0 12 34 00 0A 63 52 4E 20 47 65 74 54 65 6D 55

Response

Command Syntax: **cRA GetTem Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return internal temperature	String	GetTem
Data	Internal temperature	Int16	-5000~15000

E.g:

	cRA GetTem -100
ASCII	<STX>cRA{SPC}GetTem{SPC}-100<ETX>
HEX	02 63 52 41 20 47 65 74 54 65 6D 20 2D 31 30 30 03
Binary	02 02 BE A0 12 34 00 0D 63 52 41 20 47 65 74 54 65 6D 20 FF 9C 19

4.2.15 Command: Get error log

Query laser scanner for its internal stored error log. The latest error is always saved in the first position in the error log, the others would be shifted.

Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetELog**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get error log	String	GetELog

E.g:

cRN GetELog	
ASCII	<STX>cRN{SPC}GetELog<ETX>
HEX	02 63 52 4E 20 47 65 74 45 4C 6F 67 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 45 4C 6F 67 08

Response

Command Syntax: **cRA GetELog ErrorCount Error1 Date1 ... Error10 Date10**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return error log	String	GetELog
ErrorCount	Number of error	Uint8	10(Fixed)
Error1	The 1st error code	Uint16	0-65535
Date1	Date of the 1st error	Uint16	0-65535
…	…	Uint16	0-65535
…	…	Uint16	0-65535
Error10	The 10th error code	Uint16	0-65535
Date10	Date of the 10th error	Uint16	0-65535

E.g:

cRA GetELog 10 112 0 510 0 322 0 109 0 307 0 106 0 0 0 0 0 0 0 0 0	
ASCII	<STX>cRA{SPC}GetELog{SPC}10{SPC}112{SPC}0{SPC}510{SPC}0{SPC}322{SPC}0{SPC}109{SPC}0{SPC}307{SPC}0{SPC}106{SPC}0{SPC}0{SPC}0{SPC}0{SPC}0{SPC}0{SPC}0{SPC}0{SPC}0<ETX>
HEX	02 63 52 41 20 47 65 74 45 4C 6F 67 20 31 30 20 31 31 32 20 30 20 35 31 30 20 30 20 33 32 32 20 30 20 31 30 39 20 30 20 33 30 37 20 30 20 31 30 36 20 30 20 30 20 30 20 30 20 30 20 30 20 30 20 30 20 30 20 03
Binary	02 02 BE A0 12 34 00 35 63 52 41 20 47 65 74 45 4C 6F 67 20 0A 00 70 00 00 01 FE 00 00 01 42 00 00 00 6D 00 00 01 33 00 00 00 6A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 D4

All the supported error code are listed as below:

Error code	Description
101	Internal Error
102	
103	
104	
105	
106	
107	
108	
109	
110	
112	Internal Voltage Error
114	Internal Error
115	
116	
117	
118	
119	
120	
121	
122	
123	
124	
125	
129	
131	
132	
133	
134	Internal temperature error
135	
136	Internal Error
137	
138	
139	
140	
141	
142	

143	
144	
145	
146	
201	Power supply error
202	Internal temperature error
205	
206	Internal temperature error
207	Internal Error
208	Internal temperature error
307	Internal Communications Error
322	
323	
324	
402	External Error
405	
510	Ethernet error
999	Unknown error

4.2.16 Command: Get LED control

This command is used to control the status of the status LEDs and logo LED, configure whether they should be on in solid Green in normal operation state.

Supported Firmware

Prototype Number	P18 or higher

Request

Command Syntax: **cRN GetLED**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get control status of LED	String	GetLED

E.g:

cRN GetLED	
ASCII	<STX>cRN{SPC}GetLED<ETX>
HEX	02 63 52 4E 20 47 65 74 4C 45 44 03
Binary	02 02 BE A0 12 34 00 0A 63 52 4E 20 47 65 74 4C 45 44 44

Response

Command Syntax: **cRA GetLED Data1 Data2**

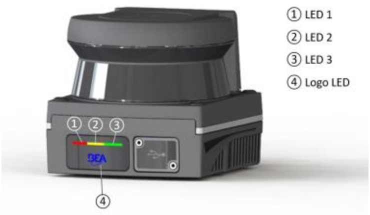
Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return control status of LEDs	String	GetLED
Data1	Control status of status LEDs	Enum8	0 - Disabled 1 - Enabled
Data2	Control status of Logo LED	Enum8	0 - Disabled 1 - Enabled

E.g:

cRA GetLED 1 1	
ASCII	<STX>cRA{SPC}GetLED{SPC}1{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 4C 45 44 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0D 63 52 41 20 47 65 74 4C 45 44 20 01 01 6B

4.2.17 Command: Get lamp state

Query laser scanner for its LED lamp color state.



Supported Firmware

Prototype Number	P16 or higher

Request

Command Syntax: **cRN GetLamp**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get lamp color state	String	GetLamp

E.g:

cRN GetLamp	
ASCII	<STX>cRN{SPC}GetLamp<ETX>
HEX	02 63 52 4E 20 47 65 74 4C 61 6D 70 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 4C 61 6D 70 39

Response

Command Syntax: **cRA GetLamp Data1 Data2 Data3 Data4**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return lamp color state	String	GetLamp
Data1	LED1 state	Enum8	0 - Black 1 - Red 2 - Green 3 - Orange
Data2	LED2 state	Enum8	0 - Black 1 - Red 2 - Green 3 - Orange
Data3	LED3 state	Enum8	0 - Black 1 - Red 2 - Green 3 - Orange
Data4	LED4 state	Enum8	0 - Black 1 - Red 2 - Green 3 - Orange

			4 - Blue

E.g:

cRA GetLamp 2 1 1 1	
ASCII	<STX>cRA{SPC}GetLamp{SPC}2{SPC}1{SPC}1{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 4c 61 6d 70 20 32 20 31 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 10 63 52 41 20 47 65 74 4c 61 6d 70 20 02 01 01 01 15

4.2.18 Command: Get Ethernet configuration

Query laser scanner for Ethernet configuration

Supported Firmware

Prototype Number	P23 or higher

Request

Command Syntax: **cRN GetEthCfg**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get Ethernet configuration	String	GetEthCfg

E.g:

cRN GetEthCfg	
ASCII	<STX>cRN{SPC}GetEthCfg<ETX>
HEX	02 63 52 4E 20 47 65 74 45 74 68 43 66 67 03
Binary	02 02 BE A0 12 34 00 0D 63 52 4E 20 47 65 74 45 74 68 43 66 67 12

Response

Command Syntax: **cRA GetEthCfg IP SubnetMask Gateway Port**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return Ethernet configuration	String	GetEthCfg
IP	IP	Uint8(4*)	0~255(4*)
SubnetMask	Subnet mask	Uint8(4*)	0~255(4*)
Gateway	Gateway	Uint8(4*)	0~255(4*)
Port	Port number	Uint16	1024~ 65535

E.g:

cRA GetEthCfg 192 168 1 2 255 255 255 0 192 168 1 1 3050	
ASCII	<STX>cRA{SPC}GetEthCfg{SPC}192{SPC}168{SPC}1{SPC}2{SPC}255{SPC}255{SPC}255{SPC}0{SPC}192{SPC}168{SPC}1{SPC}1{SPC}3050<ETX>
HEX	02 63 52 41 20 47 65 74 45 74 68 43 66 67 20 31 39 32 20 31 36 38 20 31 20 32 20 32 35 35 20 32 35 35 20 32 35 35 20 30 20 31 39 32 20 31 36 38 20 31 20 31 20 33 30 35 30 03
Binary	02 02 BE A0 12 34 00 1C 63 52 41 20 47 65 74 45 74 68 43 66 67 20 C0 A8 01 02 FF FF FF 00 C0 A8 01 01 0B EA 20

4.2.19 Command: Get hours

Query laser scanner for runtime hours.

Supported Firmware

Prototype Number	P24 or higher

Request

Command Syntax: **cRN GetHours**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get runtime hours	String	GetHours

E.g:

cRN GetHours	
ASCII	<STX>cRN{SPC}GetHours<ETX>
HEX	02 63 52 4E 20 47 65 74 48 6F 75 72 73 03
Binary	02 02 BE A0 12 34 00 0C 63 52 4E 20 47 65 74 48 6F 75 72 73 5A

Response

Command Syntax: **cRA GetHours Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return runtime hours	String	GetHours
Data	Runtime hours	Uint32	0~4294967295

E.g:

cRA GetHours 100	
ASCII	<STX>cRA{SPC}GetHours{SPC}100<ETX>
HEX	02 63 52 41 20 47 65 74 48 6F 75 72 73 20 31 30 30 03
Binary	02 02 BE A0 12 34 00 11 63 52 41 20 47 65 74 48 6F 75 72 73 20 00 00 00 64 11

4.2.20 Command: Get device name

Query laser scanner for device name. The maximum length of name is 20. Last space characters and '\0' would be ignored.

Supported Firmware

Prototype Number	P24 or higher

Request

Command Syntax: **cRN GetName**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get device name	String	GetName

E.g:

	cRN GetName
ASCII	<STX>cRN{SPC}GetName<ETX>
HEX	02 63 52 4E 20 47 65 74 4E 61 6D 65 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 4E 61 6D 65 2E

Response

Command Syntax: **cRA GetName Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return device name	String	GetName
Data	Device name	String	stringName

E.g:

	cRA GetName DeviceName
ASCII	<STX>cRA{SPC}GetName{SPC}DeviceName<ETX>
HEX	02 63 52 41 20 47 65 74 4E 61 6D 65 20 44 65 76 69 63 65 4E 61 6D 65 03
Binary	02 02 BE A0 12 34 00 16 63 52 41 20 47 65 74 4E 61 6D 65 20 44 65 76 69 63 65 4E 61 6D 65 1E

4.2.21 Command: Get window calibration status

Query laser scanner for window calibration status. [cWN SetWCalib] should be called prior to get window calibration status.

Supported Firmware

Prototype Number	P27 or higher

Request

Command Syntax: **cRN GetWCalib**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get window calibration status	String	GetWCalib

E.g:

cRN GetWCalib	
ASCII	<STX>cRN{SPC}GetWCalib<ETX>
HEX	02 63 52 4E 20 47 65 74 57 43 61 6C 69 62 03
Binary	02 02 BE A0 12 34 00 0B 63 52 4E 20 47 65 74 57 43 61 6C 69 62 1B

Response

Command Syntax: **cRA GetWCalib Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return window calibration status	String	GetWCalib
Data	Window calibration status	Enum8	0 - Processing 1 - Done 3 - Failed

E.g:

cRA GetWCalib 0	
ASCII	<STX>cRA{SPC}GetWCalib{SPC}0<ETX>
HEX	02 63 52 41 20 47 65 74 57 43 61 6C 69 62 20 30 03
Binary	02 02 BE A0 12 34 00 0F 63 52 41 20 47 65 74 57 43 61 6C 69 62 20 00 34

4.2.22 Command: Get filter status

Query laser scanner for filter status.

Supported Firmware

Prototype Number	P29 or higher

Request

Command Syntax: **cRN GetFilter**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cRN
Command	Get filter status	String	GetFilter

E.g:

cRN GetFilter	
ASCII	<STX>cRN{SPC}GetWCalib<ETX>
HEX	02 63 52 4e 20 47 65 74 46 69 6c 74 65 72 03
Binary	02 02 BE A0 12 34 00 0D 63 52 4e 20 47 65 74 46 69 6c 74 65 72 29

Response

Command Syntax: **cRA GetFilter Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cRA
Command	Return filter status	String	GetFilter
Data	Filter status	Enum8	0 - Off 1 - On

E.g:

cRA GetFilter 1	
ASCII	<STX>cRA{SPC}GetFilter{SPC}1<ETX>
HEX	02 63 52 41 20 47 65 74 46 69 6c 74 65 72 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 52 41 20 47 65 74 46 69 6c 74 65 72 20 01 07

4.3 Configurate

Set parameters to the laser scanner.

4.3.1 Command: Set IP

Set local IP address of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetIP Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set IP	String	SetIP
Data	IP	Uint8(4*)	0 ~ 255(4*)

E.g:

cWN SetIP 192 168 1 1	
ASCII	<STX>cWN{SPC}SetIP{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 49 50 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 49 50 20 C0 A8 01 01 49

Response

Command Syntax: **cWA SetIP Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set IP	String	SetIP
Data	IP	Uint8(4*)	0 ~ 255(4*)

E.g:

cWA SetIP 192 168 1 1	
ASCII	<STX>cWA{SPC}SetIP{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 49 50 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 49 50 20 C0 A8 01 01 46

4.3.2 Command: Set gateway

Set gateway of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetGW Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set gateway	String	SetGW
Data	Gateway	Uint8(4*)	0 ~ 255(4*)

E.g:

cWN SetGW 192 168 1 1	
ASCII	<STX>cWN{SPC}SetGW{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 47 57 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 47 57 20 C0 A8 01 01 40

Response

Command Syntax: **cWA SetGW Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set gateway	String	SetGW
Data	Gateway	Uint8(4*)	0 ~ 255(4*)

E.g:

cWA SetGW 192 168 1 1	
ASCII	<STX>cWA{SPC}SetGW{SPC}192{SPC}168{SPC}1{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 47 57 20 31 39 32 20 31 36 38 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 47 57 20 C0 A8 01 01 4F

4.3.3 Command: Set subnetmask

Set subnet mask of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetMask Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set subnet mask	String	SetMask
Data	Subnet mask	Uint8(4*)	0 ~ 255(4*)

E.g:

cWN SetMask 255 255 255 0	
ASCII	<STX>cWN{SPC}SetMask{SPC}255{SPC}255{SPC}255{SPC}0<ETX>
HEX	02 63 57 4E 20 53 65 74 4D 61 73 6B 20 32 35 35 20 32 35 35 20 32 35 35 20 30 03
Binary	02 02 BE A0 12 34 00 10 63 57 4E 20 53 65 74 4D 61 73 6B 20 FF FF FF 00 F3

Response

Command Syntax: **cWA SetMask Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set subnet mask	String	SetMask
Data	Subnetmask	Uint8(4*)	0 ~ 255(4*)

E.g:

cWA SetMask 255 255 255 0	
ASCII	<STX>cWA{SPC}SetMask{SPC}255{SPC}255{SPC}255{SPC}0<ETX>
HEX	02 63 57 41 20 53 65 74 4D 61 73 6B 20 32 35 35 20 32 35 35 20 32 35 35 20 30 03
Binary	02 02 BE A0 12 34 00 10 63 57 41 20 53 65 74 4D 61 73 6B 20 FF FF FF 00 FC

4.3.4 Command: Set protocol

Set the ethernet transmission protocol for the MDI data to UDP/IP or TCP/IP.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetProto Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set protocol	String	SetProto
Data	Protocol	Enum8	0 - UDP 1 - TCP

E.g:

cWN SetProto 1	
ASCII	<STX>cWN{SPC}SetProto{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 50 72 6F 74 6F 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 50 72 6F 74 6F 20 01 6F

Response

Command Syntax: **cWA SetProto Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set protocol	String	SetProto
Data	Protocol	Enum8	0 - UDP 1 - TCP

E.g:

cWA SetProto 1	
ASCII	<STX>cWN{SPC}SetProto{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 50 72 6F 74 6F 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 50 72 6F 74 6F 20 01 60

4.3.5 Command: Set port

Set the TCP/UDP port number of the laser scanner. The port number is mainly used:

- To establish TCP communication channel with host
- To transfer MDI data for UDP or TCP channel of device

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetPort Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set port number	String	SetPort
Data	Port number	Uint16	1024~65535

E.g:

cWN SetPort 3050	
ASCII	<STX>cWN{SPC}SetPort{SPC}3050<ETX>
HEX	02 63 57 4E 20 53 65 74 50 6F 72 74 20 33 30 35 30 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 50 6F 72 74 20 0B EA E0

Response

Command Syntax: **cWA SetPort Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set port number	String	SetPort
Data	Port number	Uint16	1024 ~ 65535

E.g:

cWA SetPort 3050	
ASCII	<STX>cWA{SPC}SetPort{SPC}3050<ETX>
HEX	02 63 57 41 20 53 65 74 50 6F 72 74 20 33 30 35 30 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 50 6F 72 74 20 0B EA EF

4.3.6 Command: Set MDI data packet type

Set MDI data packet type of the laser scanner, either to send the distance measurements only or send both the distance measurements and the amplitude data of each measurement.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetPType Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set MDI data packet type	String	SetPType
Data	MDI data packet type	Enum8	0 - Distance only 1 - Distance & Intensity

E.g:

cWN SetPType 1	
ASCII	<STX>cWN{SPC}SetPType{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 50 54 79 70 65 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 50 54 79 70 65 20 01 51

Response

Command Syntax: **cWA SetPType Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set MDI data packet type	String	SetPType
Data	MDI data packet type	Enum8	0 - Distance only 1 - Distance & Intensity

E.g:

cWA SetPType 1	
ASCII	<STX>cWA{SPC}SetPType{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 50 54 79 70 65 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 50 54 79 70 65 20 01 5E

4.3.7 Command: Set angular resolution

Set angular resolution of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetResol Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set angular resolution	String	SetResol
Data	Angular resolution	Enum8	0 - 0.2°@80Hz 1 - 0.1°@40Hz

E.g:

cWN SetResol 1	
ASCII	<STX>cWN{SPC}SetResol{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 52 65 73 6F 6C 20 31 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 52 65 73 6F 6C 20 01 7E

Response

Command Syntax: **cWA SetResol Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set angular resolution	String	SetResol
Data	Angular resolution	Enum8	0 - 0.2°@80Hz 1 - 0.1°@40Hz

E.g:

cWA SetResol 1	
ASCII	<STX>cWA{SPC}SetResol{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 52 65 73 6F 6C 20 32 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 52 65 73 6F 6C 20 01 71

4.3.8 Command: Set MDI data output direction

Set MDI data output direction of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetDir Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set MDI data output direction	String	SetDir
Data	MDI data output direction	Enum8	0 - Clockwise 1 - Counterclockwise

E.g:

<table>
<tr><th colspan="2">cWN SetDir 0</th></tr>
<tr><td>ASCII</td><td><STX>cWN{SPC}SetDir{SPC}0<ETX></td></tr>
<tr><td>HEX</td><td>02 63 57 4E 20 53 65 74 44 69 72 20 30 03</td></tr>
<tr><td>Binary</td><td>02 02 BE A0 12 34 00 0C 63 57 4E 20 53 65 74 44 69 72 20 00 67</td></tr>
</table>

Response

Command Syntax: **cWA SetDir Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set MDI data output direction	String	SetDir
Data	MDI data output direction	Enum8	0 - Clockwise 1 - Counterclockwise

E.g:

<table>
<tr><th colspan="2">cWA SetDir 0</th></tr>
<tr><td>ASCII</td><td><STX>cWA{SPC}SetDir{SPC}0<ETX></td></tr>
<tr><td>HEX</td><td>02 63 57 41 20 53 65 74 44 69 72 20 30 03</td></tr>
<tr><td>Binary</td><td>02 02 BE A0 12 34 00 0C 63 57 41 20 53 65 74 44 69 72 20 00 68</td></tr>
</table>

4.3.9 Command: Set angle range

Set the scanning angle range (unit: 0.01 degree) of one complete scan of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetRange Start Stop**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set angle range	String	SetRange
Start	Start angle	Int16	-4760~22760
Stop	Stop angle	Int16	-4760~22760

E.g:

cWN SetRange -4750 22750	
ASCII	<STX>cWN{SPC}SetRange{SPC}-4750{SPC}22750<ETX>
HEX	02 63 57 4E 20 53 65 74 52 61 6E 67 65 20 2D 34 37 35 30 20 32 32 37 35 30 03
Binary	02 02 BE A0 12 34 00 11 63 57 4E 20 53 65 74 52 61 6E 67 65 20 ED 72 58 DE 7E

Response

Command Syntax: **cWA SetRange Start Stop**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set angle range	String	SetRange
Start	Start angle	Int16	-4760~22760
Stop	Stop angle	Int16	-4760~22760

E.g:

cWA SetRange -4750 22750	
ASCII	<STX>cWA{SPC}SetRange{SPC}-4750{SPC}22750<ETX>
HEX	02 63 57 41 20 53 65 74 52 61 6E 67 65 20 2D 34 37 35 30 20 32 32 37 35 30 03
Binary	02 02 BE A0 12 34 00 11 63 57 41 20 53 65 74 52 61 6E 67 65 20 ED 72 58 DE 71

4.3.10 Command: Set skip spots

Set the number of spots to skip between two successive output measurements of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetSkip Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set skip spots number	String	SetSkip
Data	Skip spots number	Uint16	0 ~ Max(Spot number)-1

E.g:

cWN SetSkip 0	
ASCII	<STX>cWN{SPC}SetSkip{SPC}0<ETX>
HEX	02 63 57 4E 20 53 65 74 53 6B 69 70 20 30 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 53 6B 69 70 20 00 00 19

Response

Command Syntax: **cWA SetSkip Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set skip spots number	String	SetSkip
Data	Skip spots number	Uint16	0 ~ Max(Spot number)-1

E.g:

cWA SetSkip 0	
ASCII	<STX>cWA{SPC}SetSkip{SPC}0<ETX>
HEX	02 63 57 41 20 53 65 74 53 6B 69 70 20 30 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 53 6B 69 70 20 00 00 16

4.3.11 Command: Set contamination threshold

Set the warning and error threshold percentage value of the window contamination monitoring function of the laser scanner.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN SetCont Warning Error**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set contamination threshold	String	SetCont
Warning	Warning threshold	Uint8	0 ~ 100
Error	Error threshold (should bigger than warning)	Uint8	0 ~ 100

E.g:

cWN SetCont 20 40	
ASCII	<STX>cWN{SPC}SetCont{SPC}20{SPC}40<ETX>
HEX	02 63 57 4E 20 53 65 74 43 6F 6E 74 20 32 30 20 34 30 03
Binary	02 02 BE A0 12 34 00 0E 63 57 4E 20 53 65 74 43 6F 6E 74 20 14 28 32

Response

Command Syntax: **cWA SetCont Warning Error**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set contamination threshold	String	SetCont
Warning	Warning threshold	Uint8	0 ~ 100
Error	Error threshold	Uint8	0 ~ 100

E.g:

cWA SetCont 20 40	
ASCII	<STX>cWA{SPC}SetCont{SPC}20{SPC}40<ETX>
HEX	02 63 57 41 20 53 65 74 43 6F 6E 74 20 32 30 20 34 30 03
Binary	02 02 BE A0 12 34 00 0E 63 57 41 20 53 65 74 43 6F 6E 74 20 14 28 3D

4.3.12 Command: Reset

Set all user parameters to factory default values.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN Reset**

Command part	Description	Type	Value
Command type	Request	String	cWN
Command	Reset all parameters	String	Reset

E.g:

	cWN Reset
ASCII	<STX>cWN{SPC}Reset<ETX>
HEX	02 63 57 4E 20 52 65 73 65 74 03
Binary	02 02 BE A0 12 34 00 09 63 57 4E 20 52 65 73 65 74 0F

Response

Command Syntax: **cWA Reset**

Command part	Description	Type	Value
Command type	Response	String	cWA
Command	Reset all parameters	String	Reset

E.g:

	cWA Reset
ASCII	<STX>cWA{SPC}Reset<ETX>
HEX	02 63 57 41 20 52 65 73 65 74 03
Binary	02 02 BE A0 12 34 00 09 63 57 41 20 52 65 73 65 74 00

4.3.13 Command: Set LED control

This command is used to set to control the status of status and logo LEDs, configure whether they should be on in solid Green in normal operation state.
This would not block system error indication.

Supported Firmware

Prototype Number	P18 or higher

Request Write

Command Syntax: **cWN SetLED Data1 Data2**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set to control status of LEDs	String	SetLED
Data1	Control status of status LEDs	Enum8	0 - Disable 1 - Enable
Data2	Control status of logo LED	Enum8	0 - Disable 1 - Enable

E.g:

cWN SetLED 1 1	
ASCII	<STX>cWN{SPC}SetLED{SPC}1{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 4C 45 44 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0D 63 57 4E 20 53 65 74 4C 45 44 20 01 01 75

Response

Command Syntax: **cWA SetLED Data1 Data2**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set to control status of LEDs	String	SetLED
Data1	Control status of status LEDs	Enum8	0 - Disable 1 - Enable
Data2	Control status of logo LED	Enum8	0 - Disable 1 - Enable

E.g:

cWA SetLED 1 1	
ASCII	<STX>cWA{SPC}SetLED{SPC}1{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 4C 45 44 20 31 20 31 03
Binary	02 02 BE A0 12 34 00 0D 63 57 41 20 53 65 74 4C 45 44 20 01 01 7A

4.3.14 Command: Set network indicator

Set to enable/disable network indicator LED2 to flash.

Supported Firmware

Prototype Number	P18 or higher

Request Write

Command Syntax: **cWN SetNetLed Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set network indicator	String	SetNetLed
Data	Network incicator status	Enum8	0 - Disable 1 - Enable

E.g:

cWN SetNetLed 1	
ASCII	<STX>cWN{SPC}SetNetLed{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 4E 65 74 4C 65 64 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 57 4E 20 53 65 74 4E 65 74 4C 65 64 20 01 2B

Response

Command Syntax: **cWA SetNetLed Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set network indicator	String	SetNetLed
Data	Network incicator status	Enum8	0 - Disable 1 - Enable

E.g:

cWA SetNetLed 1	
ASCII	<STX>cWA{SPC}SetNetLed{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 4E 65 74 4C 65 64 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 57 41 20 53 65 74 4E 65 74 4C 65 64 20 01 24

4.3.15 Command: Reboot device

Reboot the laser scanner. There is no response to the command.

Supported Firmware

Prototype Number	P16 or higher

Request Write

Command Syntax: **cWN Reboot**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Reboot device	String	Reboot

E.g:

cWN Reboot	
ASCII	<STX>cWN{SPC}Reboot<ETX>
HEX	02 63 57 4E 20 52 65 62 6F 6F 74 03
Binary	02 02 BE A0 12 34 00 0A 63 57 4E 20 52 65 62 6F 6F 74 7B

4.3.16 Command: Set ethernet configuration

Set the ethernet configuration of the laser scanner.

Supported Firmware

Prototype Number	P23 or higher

Request Write

Command Syntax: **cWN SetEthCfg IP SubnetMask Gateway Port**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set Ethernet configuration	String	SetEthCfg
IP	IP	Uint8(4*)	0 ~ 255(4*)
SubnetMask	Subnet mask	Uint8(4*)	0 ~ 255(4*)
Gateway	Gateway	Uint8(4*)	0 ~ 255(4*)
Port	Port number	Uint16	1024 ~ 65535

E.g:

cWN SetEthCfg 192 168 1 2 255 255 255 0 192 168 1 1 3050	
ASCII	<STX>cWN{SPC}SetEthCfg{SPC}192{SPC}168{SPC}1{SPC}2{SPC}255{SPC}255{SPC}255{SPC}0{SPC}192{SPC}168{SPC}1{SPC}1{SPC}3050<ETX>
HEX	02 63 57 4E 20 53 65 74 45 74 68 43 66 67 20 31 39 32 20 31 36 38 20 31 20 32 20 32 35 35 20 32 35 35 20 32 35 35 20 30 20 31 39 32 20 31 36 38 20 31 20 31 20 33 30 35 30 03
Binary	02 02 BE A0 12 34 00 1C 63 57 4E 20 53 65 74 45 74 68 43 66 67 20 C0 A8 01 02 FF FF FF 00 C0 A8 01 01 0B EA 3E

Response

Command Syntax: **cWA SetEthCfg IP SubnetMask Gateway Port**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set Ethernet configuration	String	SetEthCfg
IP	IP	Uint8(4*)	0 ~ 255(4*)
SubnetMask	Subnet mask	Uint8(4*)	0 ~ 255(4*)
Gateway	Gateway	Uint8(4*)	0 ~ 255(4*)
Port	Port number	Uint16	1024 ~ 65535

E.g:

cWA SetEthCfg 192 168 1 2 255 255 255 0 192 168 1 1 3050	
ASCII	<STX>cWA{SPC}SetEthCfg{SPC}192{SPC}168{SPC}1{SPC}2{SPC}255{SPC}255{SPC}255{SPC}0{SPC}192{SPC}168{SPC}1{SPC}1{SPC}3050<ETX>
HEX	02 63 57 41 20 53 65 74 45 74 68 43 66 67 20 31 39 32 20 31 36 38 20 31 20 32 20 32 35 35 20 32 35 35 20 32 35 35 20 30 20 31 39 32 20 31 36 38 20 31 20 31 20 33 30 35 30 03

Binary	02 02 BE A0 12 34 00 1C 63 57 41 20 53 65 74 45 74 68 43 66 67 20 C0 A8 01 02 FF FF FF 00 C0 A8 01 01 0B EA 31

4.3.17 Command: Set device name

Set the device name of the laser scanner.
The maximum length of the name is 20. If the length of the name being set is greater than 20, the part exceeding the limit would be cut off.

Supported Firmware

Prototype Number	P24 or higher

Request Write

Command Syntax: **cWN SetName Data**

Command part	Description	Type	Value
Command type	Request	String	cWN
Command	Set device name	String	SetName
Data	Device name (Max length is 20)	String	stringName

E.g:

cWN SetName myDevice	
ASCII	<STX>cWN{SPC}SetName{SPC}myDevice<ETX>
HEX	02 63 57 4E 20 53 65 74 4E 61 6D 65 20 6D 79 44 65 76 69 63 65 03
Binary	02 02 BE A0 12 34 00 14 63 57 4E 20 53 65 74 4E 61 6D 65 20 6D 79 44 65 76 69 63 65 33

Response

Command Syntax: **cWA SetName Data**

Command part	Description	Type	Value
Command type	Response	String	cWA
Command	Set device name	String	SetName
Data	Device name (Max length is 20)	String	stringName

E.g:

cWA SetName myDevice	
ASCII	<STX>cWA{SPC}SetName{SPC}myDevice<ETX>
HEX	02 63 57 41 20 53 65 74 4E 61 6D 65 20 6D 79 44 65 76 69 63 65 03
Binary	02 02 BE A0 12 34 00 14 63 57 41 20 53 65 74 4E 61 6D 65 20 6D 79 44 65 76 69 63 65 3C

4.3.18 Command: Set window calibration

Set to start window calibration. This command should only be used after replacing the laser scanner’s optical window.

Supported Firmware

Prototype Number	P27 or higher

Request Write

Command Syntax: **cWN SetWCalib Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set window calibration	String	SetWCalib
Data	Window calibration	Uint8	1(Fixed)

E.g:

cWN SetWCalib 1	
ASCII	<STX>cWN{SPC}SetWCalib{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 57 43 61 6C 69 62 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 57 4E 20 53 65 74 57 43 61 6C 69 62 20 31 2B

Response

Command Syntax: **cWA SetWCalib Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set window calibration	String	SetWCalib
Data	Window calibration	Uint8	1(Fixed)

E.g:

cWA SetWCalib 1	
ASCII	<STX>cWA{SPC}SetWCalib{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 57 43 61 6C 69 62 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 57 41 20 53 65 74 57 43 61 6C 69 62 20 01 24

4.3.19 Command: Set filter

Set filter to on or off.

Supported Firmware

Prototype Number	P29 or higher

Request Write

Command Syntax: **cWN SetFilter Data**

Command part	**Description**	**Type**	**Value**
Command type	Request	String	cWN
Command	Set filter	String	SetFilter
Data	Fitler status	Enum8	0 - Off 1 - On

E.g:

cWN SetFilter 1	
ASCII	<STX>cWN{SPC}SetFilter{SPC}1<ETX>
HEX	02 63 57 4E 20 53 65 74 46 69 6C 74 65 72 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 57 4E 20 53 65 74 46 69 6C 74 65 72 20 01 19

Response

Command Syntax: **cWA SetFilter Data**

Command part	**Description**	**Type**	**Value**
Command type	Response	String	cWA
Command	Set filter	String	SetFilter
Data	Filter status	Enum8	0 - Off 1 - On

E.g:

cWA SetFilter 1	
ASCII	<STX>cWA{SPC}SetFilter{SPC}1<ETX>
HEX	02 63 57 41 20 53 65 74 46 69 6C 74 65 72 20 31 03
Binary	02 02 BE A0 12 34 00 0F 63 57 41 20 53 65 74 46 69 6C 74 65 72 20 01 16

4.4 MDI data packet

Supported Firmware

Prototype Number	P31 or higher

The format of the MDI data packet is shown as below:

Header	**Msg**	**Footer**

Header :

SYNC	Packet type	Packet size	Reserved	Reserved	Reserved	Packet NO.	Total NO.	Sub NO.	Scan freq	Scan spots	First angle	Delta angle	Time stamp
4Bytes	1Bytes	2Bytes	2Bytes	2Bytes	2Bytes	2Bytes	1Byte	1Byte	2Bytes	2Bytes	4Bytes	4Bytes	2 Bytes

Msg :

Distance	**Intensity**
Max 700*2Bytes	Max 700*2Bytes

Footer :

CRC
2Bytes

Header:

- ***SYNC*** : Synchronization pattern: BE A0 12 34;
- ***Packet type*** : Type of scan data packet, 0 = distance only, 1= distance & intensity;
- ***Packet size*** : Overall size of this packet in bytes, the max is 1433;
- ***Reserved*** : Reserved for future use;
- ***Reserved*** : Reserved for future use;
- ***Reserved*** : Reserved for future use;
- ***Packet NO.*** : Sequence number for packet, start counting from sensor startup;
- ***Total NO.*** : Total frame number of a whole scan;
- ***Sub NO.*** : The index of this packet in a whole scan (starting from 1, not greater than Total NO.);
- ***Scan freq.*** : Scan frequency (Hz);
- ***Scan spots*** : The number of scan spots within this packet;
- ***First angle*** : Absolute angle of the first spot in this packet (1/1000°);
- ***Delta angle*** : Delta angle between two consecutive output spots (1/1000°);
- ***Timestamp*** : Timestamp of the packet. unit is ms;

Msg

- ***Distance*** : Measured distance in mm, invalid distance reture max. The maximum number of distances is 700;
- ***Intensity*** : Measured intensity (if intensity output is asked), The maximum number of intensity is 700;

Note: The maximum size of Msg should not be greater than 1400. If the Msg contains both distance and intensity, the maximum number of distances is 350, and the maximum number of intensity is 350. If the Msg contains distance only, the maximum number of distances could reach 700.

Footer

- ***CRC***: CRC16 check of the packet, including Header and Msg;

Max length of MDI: Header + Msg + Footer = 31 + 700 * 2 + 2 = 1433 Bytes

Example:

```
BE A0 12 34 01 00 35 00 00 00 00 00 00 00 01 05 01 00 50 00 05 FF FF CF 90 00 00 4E
20 00 1A 01 55 01 50 01 00 02 00 01 22 00 60 00 55 01 00 00 20 00 60 DD 2F
```

BE A0 12 34	: **SYNC**	
01	: **Packet type**	Distance & intensity
00 31	: **Packet size**	Total size of the frame. 53 bytes in this frame
00 00	: **Reserved**	Reserved
00 00	: **Reserved**	Reserved
00 00	: **Reserved**	Reserved
00 01	: **Packet NO.**	This is the first sequence of the packet
05	: **Total NO.**	The whole scan has 5 packets
01	: **Sub NO.**	This is the first packet of the whole 5 scan
00 50	: **Scan freq.**	The scan frequency is 80Hz
00 05	: **Scan spots**	This packet includes 5 spots information
FF FF CF 90	: **First angle**	First angle of this packet. This first angle is -12400/1000 = -12.4°
00 00 4E 20	: **Delta angle**	Delta angle is 20000/1000 = 20.0°
00 1A	: **Timestamp**	This is the timestamp of this packet Unit is ms. So the time is 26ms
01 55	: **1st spot distance**	This distance is 341mm
01 50	: **2nd spot distance**	This distance is 336mm
01 00	: **3rd spot distance**	This distance is 256mm
02 00	: **4th spot distance**	This distance is 512mm
01 22	: **5th spot distance**	This distance is 290mm
00 60	: **1st spot intensity**	This intensity is 96
00 55	: **2nd spot intensity**	This intensity is 85
01 00	: **3rd spot intensity**	This intensity is 256
00 20	: **4th spot intensity**	This intensity is 32
00 60	: **5th spot intensity**	This intensity is 96
DD 2F	: **CRC**	CRC16

From the frame message, the angle of each spot can be calculated as below:
1st : -12.4°(First angle) + 20.0°(Delta angle) * (1 - 1) = -12.4°
2nd : -12.4°(First angle) + 20.0°(Delta angle) * (2 - 1) = 7.6°
3rd : -12.4°(First angle) + 20.0°(Delta angle) * (3 - 1) = 27.6°
4th : -12.4°(First angle) + 20.0°(Delta angle) * (4 - 1) = 47.6°
5th : -12.4°(First angle) + 20.0°(Delta angle) * (5 - 1) = 67.6°

CRC code

The verification field of the frame is a CRC16. The properties of the CRC processing are presented below: (All bytes are considered for computing the CRC)
The polynomial is 0x90d9
Preset value is 0
A source code for computing the CRC is proposed below:

```
#define BYTE unsigned char
#define WORD unsigned short
#define BEA_POLYNOM 0x90d9
WORD CRC16(BYTE *buf_, WORD cnt_)
{
        WORD crc = 0; /* CRC value is 16bit */
        WORD i, j;
        for (i = 0; i < cnt_; i++)
        {
                crc ^= (WORD)(buf_[i] << 8); /* move byte into MSB of 16bit CRC */
                for (j = 0; j < 8; j++)
                {
                        if ((crc & 0x8000) != 0) /* test for MSB = bit 15 */
                        {
                                crc = (WORD)((crc << 1) ^ BEA_POLYNOM);
                        }
                        else
                        {
                                crc <<= 1;
                        }
                }
        }
        return crc;
}
```