

How can I ...

Extract diagnostics information from Trio E-Series radios?



1. Introduction

Some system applications require Trio radios to be polled via software other than Tview+ Diagnostics. In some applications it may be desirable to poll Trio radios software or hardware that have no direct link to TView+ Diagnostics software. This is typically required when a driver is being designed. This technical note will explain how to structure a diagnostics message for each type of Trio radio that would be locally connect to the source of the diagnostics message.

2. Message Structure

Programming Protocol Packet Structure

The Diagnostics protocol implemented by Trio radios is known as the TVIEW Diagnostic/Programming Protocol V2. This is a command/response protocol whose format is:

[II] [DD DD DD] [SS SS SS] [TT] [PP PP ... PP] [CC [SB]

II = SID code byte (usually 0)

DD = Destination address (3 bytes BDC)

SS = Source address (3 bytes BDC)

TT = Command type (1 byte) eg: For command type 'T', TT=54 Hexadecimal (84 decimal)

PP = Command parameters (byte values as required by command type)

CC = Checksum

SB = SLIP Frame End Byte (FEND)

SID Code Byte (Type II):

The SID code byte is usually zero (0). The System Port is always listens for messages on Stream 0.

Destination Address (Type DD):

The destination should be the localhost address, or 'FF 00 00'. When connected to the System Port, the radio will always recognize messages destined for the "localhost" as messages for itself.. Alternatively, the units serial number can be used as the destination address. (eg. '06 55 21')

Source Address (Type SS):

The Source address is the address of a device initiating the Programming Session. This can be any number but is normally '00 00 01'. The source address is 3 Bytes long. (SS SS SS = 00 00 01)

Command Type (Type TT):

The command type refers to the type of command being sent. Only one Command Type needs to be used when locally polling a Trio radio for Diagnostics information, which is the command type 'G'. The command type is 1 Byte long. (TT = 47) -> '47' is the Hexadecimal representation of the letter 'G'.

Command Parameter (Type PP):

Command parameters may be required depending on the Command Type. Follow the example as shown.

Command Checksum (Type CC):

The command checksum is calculated by XORing every Byte from the 1st address Byte before the checksum. (CC = DD XOR DD XOR DD XOR SS XOR SS XOR SS XOR TT XOR PP XOR PP XOR)

Slip Frame End Byte (Type SB):

Each message must be SLIP encoded, which means each message must be ended with a FEND character. The FEND character is C0. (ii dd dd dd ss ss ss pp pp pp cc 'C0') a Separate Technote (TN-8) is available with more detail on SLIP encoding.

3. Trio E-Series Remote diagnostics message



3.1 Structure Table

E-Series remote PICs Used for retrieval of normal operating parameters

Message to radio				Response	Purpose
Command Code: Get PIC 'G'				Size (bytes)	
PIC	PIC (Hex Value)	Name	Size(bytes)	Size (bytes)	
98	62	Session Code	2	2	To determine if a reboot has occurred. if the session code is not identical to the last read session code, a reboot has occurred.
198	C6	SystemStatusFlags	2	1	Determine if; diagnostics enabled, is a base station, is online/offline base.
3	03	Temperature	2	2	Deci degrees C
6	06	RSSI	2	2	0.1dBm
9	09	Fwd Tx Power	2	2	0.1dBm
15	0F	Rx Freq Error	2	2	Hertz
12	0C	Supply volts	2	2	0.1volts
18	12	Rev Tx Power	2	2	0.1dBm
Total			16	15	

3.2 Put it all together

Interrogating the radio for diagnostics information

SID	Destination	Source	Command Type	Command Parameters	Checksum	FEND
00	FF 00 00	00 00 01	47	00 62 00 C6 00 03 00 06 00 09 00 0F 00 0C 00 12	00	C0

Entire Packet	
00 FF 00 00 00 00 01 47 00 62 00 C6 00 03 00 06 00 09 00 0F 00 0C 00 12 00 C0	

Response from the radio (Example only, results will vary from radio to radio however structure will not.)

SID	Destination	Source	Command Type	Command Parameters response	Checksum	FEND
00	00 00 01	06 58 33	67	C3 25 01 01 61 FA 5F 01 2B 00 00 00 89 00 73	F9	C0

3.3 Translating the Response

The actual diagnostics data is held within the 'command parameter response' section. This data now needs to be separated to be able to turn it into useful information. Referring to the 3.1 Structure table, the 'Response column will indicate how to separate the received command parameter response.

Name	Command Parameter Response	Translated Value (Decimal)	meaning of value
Session Code	C3 25	49957	Used for reference
SystemStatusFlags	01	1	diagnostics installed
Temperature	01 61	353	35.3 Degrees .C
RSSI	FA 5F	64095	(Value - 65536) = -144dBm
Fwd Tx Power	01 2B	299	+29.9 dBm
Rx Freq Error	00 00	0	no Freq error
Supply volts	00 89	137	13.7VDC
Rev Tx Power	00 73	115	+11.5dBm