RDS92

Messages description

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2 RDS92 basics

Radiomodem communicates with target device using serial interface. Standard protocol is defined simple. Transmitted data must be supplement by header and check sum. Header contains control byte, target address and number of data. Radiomodem confirms received packed by ACK char. The same form is use in the second way. User has at one's disposal, command for getting current radiomodem state.

2.1 Communication between radiomodem (CNC) and connected device (TPC)

CNC - Control Network Computer
TPC - Technology Process Computer

TPC and CNC message hand on				
TPC		**CNC**		**Description**
TPC DATA	→			Posting request
		←	ACK	Acknowledge
		←	NAK	Rejection
		←	CNC DATA	Message for TPC from net
ACK	→			TPC acknowledge
NAK	→			TPC rejection

2.2 Information about radiomodem state

State message				
TPC		CNC		Description
TPC REQ	➔			State request
		➔	CNC STATE	State answer

3 Messages description

3.1 TPC DATA – posting request (to transmit data to target)

Data message from TPC to another TPC at defined network station.

44H	Target	Length Lo	Length Hi	Data 1	...	Data N	Check SUM

44H Packet ID (44 hexa)
Target target station address
Length Lo lower byte of data length
Length Hi higher byte of data length, the total maximum of length is 1024 byte
Data 1 ... Data N transmitted data
Check Sum 1 byte check sum, sum of all packet byte (including check sum byte) is 00H (modulo 256)

3.2 CNC DATA – delivering incoming data to connected TPC

Data message which CNC received from network and now it sends to TPC.

44H	Sender	Length Lo	Length Hi	Data 1	...	Data N	Check SUM

44H Packed ID (44 hexa)
Sender source station address
Length Lo lower byte of data length
Length Hi higher byte of data length, the total maximum of length is 1024 byte
Data 1 ... Data N transmitted data
Check Sum 1 byte check sum, sum of all packet byte (including check sum byte) is 00H (modulo 256)

3.3 TPC REQ – CNC state request

This request sends TPC when it wants information about CNC state.

51H

3.4 CNC STATE - information about CNC state

Response to TPC REQ, CNC return 3 byte with CNC state information.

54H	CNC addr.	STATE

CNC addr. station network address
STATE CNC current state

3.4.1 STATE description:

7	6	5	4	3	2	1	0

Bit 0 Receiving from HOST (RTS) ON/OFF
Bit 1 CNC send data from TPC YES/NO
Bit 2 Sending YES/NO
Bit 3 Receiving YES/NO
Bit 5 RF channel buffer empty YES/NO

3.5 CNC ERROR – message about error

Error message informs TPC that message could not be sent to recipient. Error message contains target address, last transmitter and type of communication (between two radio station or CNC – TPC).

45H	04H	00H	Target	No-acked	Error	Txed	Check Sum

45H Error message ID
04H, 00H length 4 bytes
Target target station address
No-acked Address of station that does not acknowledged receiving
Error **00H** Message was not hand over between two radio station
02H TPC of target do not acknowledged receiving of message from CNC, signal CD is not active (it is possible to connect CD to power source of target device for information about power failure)
03H TPC of target do not acknowledged receiving of message from CNC, signal CD is active
Txed station address that last transmitted message and generate error message
Check Sum 1 byte check sum, sum of all packet byte (including check sum byte) is 00H (modulo 256)

4 Radio modem statistics

All stations contain four days statistics data. Those information could be read and evaluate.

4.1 Statistics request

48H	Target	Suma

48H Statistics request message ID
Target target station address
Check Sum 1 byte check sum, sum of all packet byte (including check sum byte) is 00H (modulo 256)

4.2 Statistics response

49H	Source 1	Length Lo	Length Hi	Level 1	Cadd 1	Cmul 1	MaxRec

TopRec	Data	Source 2	Level 2	Cadd 2	Cmul 1	CheckSum

Item	Length	Description
49H	1	Statistics response ID
Source 1	1	network address of station that sent those statistics data
Length Lo	1	lower byte of message length
Length Hi	1	higher byte of message length

Item	Length	Description
Level 1	1	signal level measured by station during statistics request message
Cadd 1	1	additive constant for Level 1
Cmul 1	1	multiplicative constant for Level 1
MaxRec	1	number of statistics records (4)
TopRec	1	current record pointer (that is now updated)
Data	100	statistics data from radiomodem (see table below)
Source 2	1	network address that first received this message (and retranslated or sent this message to another station or to TPC)
Level 2	1	signal level measured by station Source 2 during receiving statistics response message
CAdd2	1	additive constant for Level 2
CMul2	1	multiplicative constant for Level 2
CheckSum	1	1 byte check sum, sum of all packet byte (including check sum byte) is 00H (modulo 256)

Item **Data** contains **MaxRec** (4) records of following type:

Item of Data	Length	Description
Sent	4	number of successfully sent message
Not Sent	4	number of message that still do not sent
Chan. Request	4	number of channel request
Retry	4	number of channel request retries
Max. Chan. Request	4	number of messages that overdraw number of channel request
Reset	4	number of radiomodem reset
Validity	1	information about record completion and data validity 00H ... record is active or data is not valid 01H ... record is closed, data is valid

4.2.1 Signal level calculation

Result is positive number that denotes value of signal level in minus dBm.

Signal Level [-dBm] = CAdd - (Level *CMul / 100)

5 Characteristic control chars

ACK	06H	Acknowledge between CNC and TPC
NAK	15H	No acknowledge between CNC and TPC
TPC_MES	44H	Data message ID from TPC to CNC
CNC_MES	44H	Data message ID from CNC to TPC.
REQUEST	51H	CNC state request
CNC_STATUS	54H	CNC state message ID
CNC_ERR	45H	Error message ID from CNC to TPC
TPC_GS	48H	Statistics request ID
CNC_SS	49H	Statistics response ID

6 Communication data rate

Communication data rate between CNC and TPC is adjustable in range 75 bit/sec to 153 600 bit/sec. Standard setting is 38 400 bit/sec, 8 data bits, no parity and 1 stop bit.

7 RDS92 phase description

7.1 Data message transfer from TPC to CNC

As far as data message has good format and CNC has free input buffer, CNC acknowledge message by ACK during 200 msec or immediately after completing current transmitting message. In the case of bad message format or full input buffer, CNC send NAK as answer. This message is not processed by CNC. If handshake is on, signal RTS is activated after fulfill input buffer.

7.2 CNC state request

After state request, CNC sent answer during 200 msec or immediately after completing current transmitting message.

7.3 Data message transfer from CNC to TPC

After TPC send message, ACK is expected during defined time (10 to 2550 msec). When CNC do not received ACK or received NAK, then CNC resent message to TPC again. When second sending of message is unsuccessful, CNC generate error message (about no delivering) to TPC.

7.4 Error message (about no delivering to recipient)

When radio network is not able to delivery message to recipient, CNC that sent this message receive error message. This error message is hand over to TPC that generate undelivered message. Time to receive error message is depended on number of retranslation and number of retries. For direct communication and 3 retries would be time shorter than 5 seconds. For one retranslation and 3 retries would be time shorter than 10 seconds. In the case of unfavorable conditions and more retranslations is not sure to delivery error message to source CNC. TPC answer to error message is the same as for data message.

7.5 Statistics request

Is important to use statistics for testing and reliability purpose. In the case of retranslation no error message would be generated. User must use time out system.

7.6 Statistics

This message contains series of information about signal level, reliability and successfulness from single station during its operation. For high significance of statistics is required to hold power at radiomodem. Between CNC and TPC is statistics message similar to data message, TPC must answer by ACK or NAK.

7.7 Radio network testing

It is requirement to use function "Statistic request" for network testing during activating or normal operation for preventive reason. Information about statistics is necessary to save to file for later service. The minimum time to collect statistics from all station is two times in one day.