1 Basics

1.1 Communication

Communication with the command station Z21 is done via UDP by using port 21105 or 21106. Control applications on the client (PC, App, ...) should primarily use port 21105.

Communication is always asynchronous, i.e. broadcast messages can occur between a request and the corresponding response.

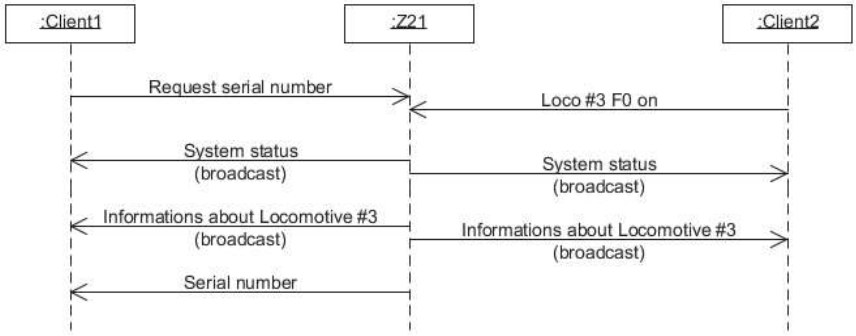

Figure 1 Example Sequence: Communication

Each client is expected to communicate with the Z21 once per minute, otherwise it will be removed from the list of active participants. If possible, a client should log off from the command station with the command LAN_LOGOFF.

1.2 Z21 Dataset

1.2.1 Structure

A Z21 data record, i.e. a request or response, is structured in the following way:

DataLen (2 Byte)	Header (2 Byte)	Data (n Bytes)

- **DataLen** (little endian):
  Total length over the entire data set including DataLen, Header and Data, i.e. DataLen = 2+2+n.
- **Header** (little endian):
  Describes the Command and the Protocol's group.
- **Data**:
  Structure and number depend on the command. For a detailed description, see the respective command.

Unless otherwise specified, the byte order is little-endian, i.e. first the low byte, then the high byte.

1.2.2 X-BUS Protocol tunneling

Requests and responses *based* on the X-BUS protocol are transmitted with the Z21-LAN-Header **0x40** (***LAN_X_***xxx). This only refers to the protocol, because these commands have nothing to do with the physical X-BUS of the Z21, but are exclusively addressed to the LAN clients or the Z21.

The actual X-BUS command is located inside the Data field within the Z21 data record. The last byte is a checksum and is calculated as XOR via the X-BUS command. Example:

DataLen		**Header**		**Data**			
				X-Header	**DB0**	**DB1**	**XOR-Byte**
0x08	0x00	**0x40**	0x00	**h**	**x**	**y**	h XOR x XOR y

1.2.3 LocoNet tunneling

From Z21 FW Version 1.20.

With the Z21-LAN headers 0xA0 and 0xA1 (LAN_LOCONET_Z21_RX, LAN_LOCONET_Z21_TX), messages received or sent by the Z21 on the LocoNet bus are forwarded to the LAN client. The LAN client can subscribe to these LocoNet messages by using the ***2.16*** LAN_SET_BROADCASTFLAGS.

The LAN client can write messages to the LocoNet bus via the Z21-LAN header **0xA2** (**LAN_LOCONET_FROM_LAN**).

This way the Z21 can be used as an Ethernet/LocoNet gateway, where the Z21 is also the LocoNet master managing the refresh slots and generating the DCC packets.

The actual LocoNet message is located inside the Data field within the Z21 data record.

Example Loconet message OPC_MOVE_SLOTS <0><0> („DISPATCH_GET“) is sent by the Z21:

DataLen		**Header**		**Data**			
				OPC	**ARG1**	**ARG2**	**CKSUM**
0x08	0x00	**0xA0**	0x00	**0xBA**	**0x00**	**0x00**	**0x45**

More information about the LocoNet Gateway can be found in section ***9*** LocoNet.

1.3 Combining datasets in one UDP packet

In the payload data of a UDP packet, several independent Z21 data sets can also be sent together to one recipient. Each recipient must be able to interpret these combined Z21 dataset packets.

Example

Following combined Z21 datasets in one UDP packet...

UDP Paket				
IP Header	UDP Header	UDP Payload		
		Z21 Dataset 1	Z21 Dataset 2	Z21 Dataset 3
		LAN_X_GET_TOURNOUT_INFO #4	LAN_X_GET_TOURNOUT_INFO #5	LAN_RMBUS_GETDATA #0

... is equivalent to these three UDP packets:

UDP Paket 1		
IP Header	UDP Header	UDP Payload
		Z21 dataset
		LAN_X_GET_TOURNOUT_INFO #4

UDP Paket 2		
IP Header	UDP Header	UDP Payload
		Z21 dataset
		LAN_X_GET_TOURNOUT_INFO #5

UDP Paket 3		
IP Header	UDP Header	UDP Payload
		Z21 dataset
		LAN_RMBUS_GETDATA #0

The UDP packet must fit into an Ethernet MTU, i.e. considering IPv4 header and UDP header there is a maximum of 1500-20-8 = 1472 bytes of payload data.