

# **MIC01 Multi Interface Controller**

## **System Manual**

## MIC01

Multi Interface Controller

PRELIMINARY!!!!!!!!!!

12.10.2007

### Contents

1	Module presentation .....	4
2	MIC module stack.....	5
3	Products vs. modules .....	6
4	User interfaces .....	7
4.1	Web interface .....	7
4.1.1	System Page .....	7
4.1.2	Network Page.....	8
4.1.3	Modem Page (only in option R).....	10
4.1.3.1	SMS/CSD mode pages (only in option R).....	11
4.1.3.2	NETSCAN mode page (only in option R).....	14
4.1.3.3	5.1.3.3 GPRSCON mode page (only in option R).....	15
4.1.4	Logger Page (only in option R) .....	16
4.1.4.1	Logger manager page (only in option R).....	17
4.1.5	Special Page .....	18
4.2	Telnet interface.....	19
4.2.1	Overview .....	19
4.2.2	Connection .....	19
4.2.3	Main menu .....	19
4.2.3.1	ACK command .....	20
4.2.3.2	GET and PUT commands .....	20
4.2.3.3	CONFIG command.....	20
4.2.4	Configuration sub menus .....	21
4.2.4.1	Configure Linet network.....	21
4.2.4.2	Configure Local network.....	25
4.2.4.3	Net status.....	25
4.2.4.4	Configure IP address.....	26
4.3	Service interface .....	26
4.4	SMS interface (only in option R) .....	26
5	Linet group types .....	28
5.1	TOGGLE .....	28
5.2	DIMMER.....	28
5.3	IO.....	29
5.4	LAMP .....	30
5.5	LMON .....	30

## MIC01

Multi Interface Controller

PRELIMINARY!!!!!!!!!!

12.10.2007

---

5.6	DELAY.....	31
5.7	DATA EXCHANGE.....	31
5.8	DATA 8,12,16.....	32
5.9	ADSTATE.....	33
5.10	CONTROL.....	33
5.11	D12M2SS.....	33
5.12	SPU.....	34
5.13	6.13 IODELAY.....	35
5.14	MDELAY.....	36
6	Server interfaces.....	37
6.1	UDP interface.....	37
6.2	Modbus interface.....	37
6.3	GPRS interface (only in option R).....	38
7	Diagnostic and ready LEDs.....	39
8	File System.....	40
8.1	File system type.....	40
8.2	File system size.....	40
8.3	Access to file system.....	40
8.4	Directories and files.....	40
8.4.1	Root directory.....	40
8.4.2	8.4.2 http directory.....	41
8.4.2.1	full directory.....	41
8.4.2.2	lite directory.....	41
8.4.3	bin directory.....	42
8.4.4	System directory.....	42
8.4.4.1	Settings file structures.....	42
9	MIC software revision update in Windows environment.....	45
9.1	Required files and scripts.....	45
9.2	Update application code.....	45
9.3	Update all web pages.....	45
10	Related documents.....	46

## 1 Module presentation

MIC family consists of four modules. The required features of each application can be fulfilled with these modules. New module is easy to add to system if the user wants to add some extra features to the system later on.

### MIC-CPU

MIC-CPU module is the “brains” of the MIC system. Module contains the processor and other necessary peripheral chips for driving the other MIC stack modules. Stack connector is used for internal communication between MIC-CPU and other modules. 10/100Mb Ethernet connector offers the TCP/UDP/IP interfaces for user and for the host system like a server. Only one +24V power supply connection to the MIC-CPU is required for the whole MIC stack. For details see mic-cpu.pdf.

### MIC-LIN

MIC-LIN module is a full Linet network interface. It makes possible to connect 200 Linet node based interface modules to the system. Linet network offers full duplex 200x80 bits/s data rate with maximum cable length 1000m. See [www.linet.fi](http://www.linet.fi) and mic-lin.pdf for details.

### MIC-RIF

MIC-RIF module is a radio interface module. It consists of GSM/GPRS modem and SIM cardholder. External tri band GSM antenna and SIM card is required for GSM/GPRS connection. GSM/GPRS modem makes it possible to use GSM-data, SMS messages and GPRS connection for controlling and monitoring the MIC system. uSD memory cardholder is also soldered on the module. uSD card interface supports FAT12/16/32 file systems and memory card sizes 64MB – 2GB. Memory card is used as data logger storage. For details see mic-rif.pdf.

### MIC-IO (not yet in production)

MIC-IO module can be used in numerous local measurement and controlling applications together with a MIC-LIN and MIC-CPU cards. It is also possible to use MIC-IO module as a stand alone local I/O controller together with MIC-CPU module. The module consists of the ten separate IO points: Four digital input/output points, two analogy input points, two analogy output points and two pt-1000 temperature measurement points. The maximum length of sensor wire is about 2m. The measurement and IO-points are managed as Linet groups in MIC system. For details see mic-io.pdf.

### 2 MIC module stack

The modular MIC system builds on the base of the MIC-CPU. It is always located at the bottom of the stack. No other modules are required in the minimum configuration (like in MIC-C). If the MIC-RIF module is not used, the IO modules like MIC-LIN (distributed IO-network) and/or MIC-IO (local IO) are connected on top of the MIC-CPU. Figure 1 shows the full stack configuration and recommended orders of the modules.

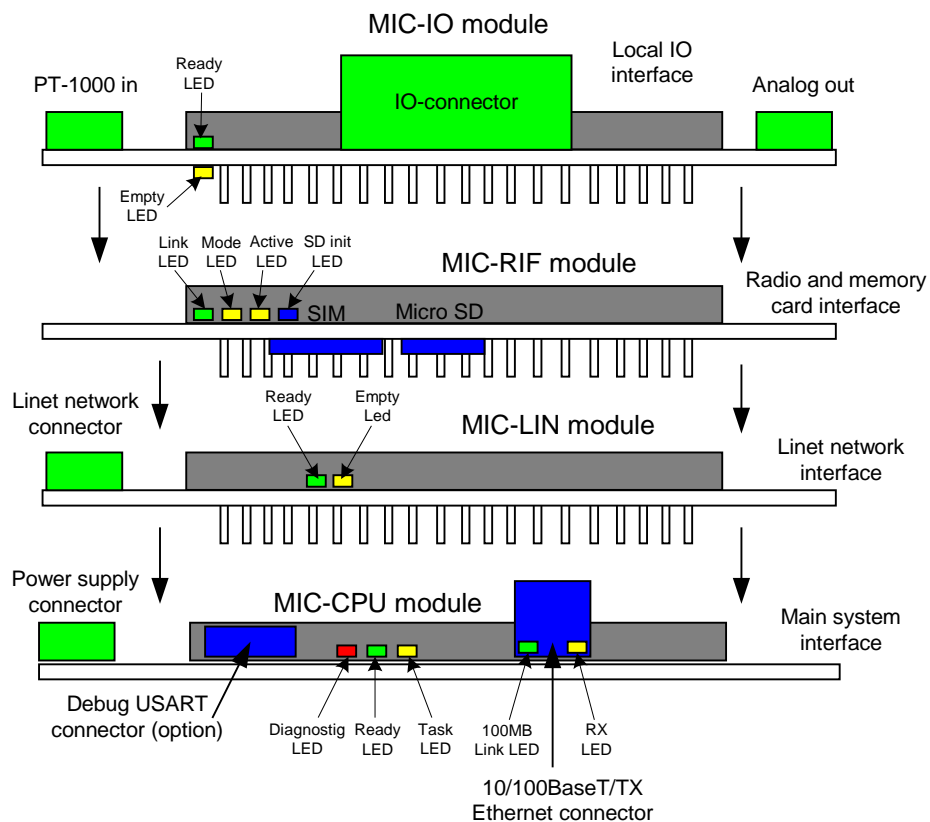


Figure 1. Stack structure

### 3 Products vs. modules

The products consist of 1-4 modules. Required module/modules for any available product are presented on the Table 1.

Table 1. **Products vs. modules**

Products vs. modules	MIC-C	MIC-CL	MIC-CLR	MIC-CI	MIC-CIR
MIC-CPU	*	*	*	*	*
MIC-LIN		*	*		
MIC-RIF			*		*
MIC-IO				*	*

## 4 User interfaces

There are two different user interfaces available in all products: Telnet and Web interface. Both of these interfaces require Ethernet connection to the system. Telnet and Web interfaces work over TCP connection. SMS command interface is available only in MIC-CLR and MIC-CIR products.

### 4.1 Web interface

Web interface is used as monitor and basic setup tool. Web server interface is listening to TCP port number 80 and is waiting for incoming TCP connections from the network. Ethernet connection and Web browser are required for communication. On main page a user can select HTML version that is suitable for his/her Web browser. Full HTML version is used with normal Web browsers like Mozilla Firefox or Internet Explorer. Mobile Web browsers may work better with HTML lite version.

Note that **No** in the **Setup** column of the following tables indicates read-only information.

#### 4.1.1 System Page

System info:

Table 2. General info

Name:	Data:	Setup:	Info:
Device name	MIC, LIC, ...	No	System name
SW version	9.0.0 to 999.999.999	No	System software version
Temperature	-50 to +125 C	No	System hardware temperature
Service code	0 to 65535	No	Diagnostic code value. See chapter 7
MAC address	xx:xx:xx:xx:xx:xx	No	Ethernet MAC address

Table 3. Modules present

Name:	Data:	Info:
Module 1	CPU-01 to CPU-99	Module presents with device HW version
Module 2	LIN-01 to LIN-99	Module presents with device HW version
Module 3	RIF-01 to RIF-99	Module presents with device HW version
Module 4	IO1-01 to IO1-99	Module presents with device HW version
Module 5	IO2-01 to IO2-99	Module presents with device HW version

## MIC-01

Multi Interface Controller

PRELIMINARY!!!!!!

8 (46)

12.10.2007

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Date and time:

Clock chip has battery backup capacity for about 2 days.

Table 4. Date and time

Name:	Data:	Setup:	Info:
Date	xx:xx:xxxx	Yes	Date, month, year
Time	xx:xx:xx	Yes	Second, minute, hour

TCP/IP services:

New IP address that is changed by user becomes valid after next hardware reset.

Table 5. Network address

Name:	Data:	Setup:	Info:
IP address	xxx.xxx.xxx.xxx	Yes	System IP address (default: 192.168.1.13)

New UDP port that is changed by user becomes valid after next hardware reset.

Table 6. Network ports

Name:	Data:	Setup:	Info:
Web server	80	No	Web server connection port
Telnet server	23	No	Telnet server connection port
TFTP server	69	No	TFTP server connection port
Modbus server	502	No	Modbus server connection port
UDPIF server	0-65535	Yes	UDP interface connection port (default: 1313)

### 4.1.2 Network Page

Linnet and local network page

Network status block:

Table 7. Network status

Name:	Data:	Setup:	Info:
Network state	State string	No	Network state information

Name:	Data:	Setup:	Info:
Configuration name	Name string	No	Configuration name
Created groups	0-200	No	Number of created groups
Configured nodes	0-200	No	Number of configured nodes
Missing nodes	0-200	No	Number of missing nodes
Frame size	50/100/200	No	Network frame size
Frame reject status	32-bit counter	No	Frame reject status counter
Driver temperature	-50 to +150 C	No	Network driver temperature
Driver positive voltage	0 to 50 V	No	Network driver positive voltage

### Created groups:

All created groups are listed in the Created groups chapter. Details of the selected group are presented on the Group status chapter after the group select.

Table 8. Created groups

Parameter 1:	Parameter 2:	Parameter 3:	Parameter 4:
Group name	Group ID	Configured nodes	Missing nodes

### Group status:

Show status of the selected group.

Table 9. Network status

Name:	Data:	Setup:	Info:
Group type	Type string	No	Group type. See chapter 5
Group ID	0-200	No	Group identification number
Configured node IDs	ID1, ID2, ...	No	Number of created groups
Missing node IDs	ID1, ID2, ...	No	Number of missing nodes
Master/Slave	Master/Slave	No	Group master/slave option
Master on group ID	0-200	No	Master on group ID
Master off group ID	0-200	No	Master off group ID
Group special value	32-bit value	No	Group special value
Group input value	0 to 65535	No	Group input value
Group output value	0 to 65535	Yes	Set group output value

### 4.1.3 Modem Page (only in option R)

GMS/GPRS info:

Table 10. Network info

Name:	Data:	Setup:	Info:
Operator name	Name string	No	Operator name that is stored in the SIM card.
Signal strength	0-32	No	Strength (level) of the signal. Level 32 is the best signal strength.

Table 11. Modem info

Name:	Data:	Setup:	Info:
Modem state	State string	No	Network state. Show current active state of the modem. Details of the state are presented in the state info field.
State info	Info string	No	State info. Show further information for modem state.
Active mode	CSD/SMS, NETSCAN or GPRSCON	No	Selected mode of the modem. New mode is available after next hardware reset.
IMEI code	Code string	No	IMEI code of the modem
SW revision	Revision string	No	SW revision of the modem internal software. This is not same as controller SW revision.
Subscriber number	Number string	No	Subscriber number i.e. the phone number of the SIM (stored in SIM card).

GMS/GPRS setup:

Table 12. Mode selects

Name:	Data:	Setup:	Info:
Modem mode	A list of available modes	Yes	Select modem mode from list. New mode becomes valid after next hardware reset.

Table 13. SIM parameters

Name:	Data:	Setup:	Info:
PIN code	4 digit	Yes	Set SIM PIN code. This field left empty if the SIM code asking is disabled on SIM card.
PUK code	6 digit	Yes	Set SIM PUK code (optional)

Table 14. SMS parameters

Name:	Data:	Setup:	Info:
Service Center Number	Number string	Yes	Set SMS SCN in international format. Fort the SMS/CSD connection mode only

Table 15. GPRS parameters

Name:	Data:	Setup:	Info:
APN	APN string	Yes	Set GPRS Access Point Name. For the CPRSCON mode only.
Username	Username string	Yes	GPRS username (option)
Password	Password string	Yes	GPRS password (option)

#### 4.1.3.1 SMS/CSD mode pages (only in option R)

##### CSD terminal connection:

User can connect to the controller with basic GSM modem device and terminal client software. The connection way provides the straight access to the network configuration interface of the controller (same as Telnet interface). Only one data call connection is supported in the same time.

Table 16. Data call password protection

Name:	Data:	Setup:	Info:
Password protection	Enable/disable	Yes	Enable/disable password protection. When enabled the system asks the password on start of the data call connection.
System password	Password string	Yes	System password. Define a new system password. Default password is Linet

### SMS command processor:

User/users can control and monitor the groups of the controller with SMS messages. By default all the received SMS messages executed by the SMS command processor. User number protection option is used the limit phone numbers that can access the SMS command processor.

Table 17. Processor protection

Name:	Data:	Setup:	Info:
User number protection	Enable/disable	Yes	Enable/disable user number protection

Table 18. User phone numbers in international format

Name:	Data:	Setup:	Info:
User number 1	Number 1 string	Yes	Set user number 1
User number 2	Number 2 string	Yes	Set user number 2
User number 3	Number 3 string	Yes	Set user number 3
User number 4	Number 4 string	Yes	Set user number 4
User number 5	Number 5 string	Yes	Set user number 5

### SMS alerts:

Add, edit and delete SMS alerts. Maximum alert count is limited to ten.

Table 19. Manage alerts

Name:	Data:	Setup:	Info:
Add a new alert name	Alert name	Yes	Add a new alert in the logger system
Alert to be edited	A list of available alerts	Yes	Edit the selected alert
Alert to be cleared	A list of available alerts	Yes	Clear the selected alert

### SMS send test:

Send SMS test message to the recipient's number

Table 20

Name:	Data:	Setup:	Info:
Number	Number string	Yes	Recipient's number in international format
Message test	Message string	Yes	Message text. Define text for message. Maximum character count is limited to 160.

Table 20. SMS test

### 4.1.3.1.1 SMS alert manager page (only in option R)

Alert manager:

Edit selected alert.

Table 21. Alert name

Name:	Data:	Setup:	Info:
Alert name to be edit	Name string	No	Alert name to be edit

Table 22. Source

Name:	Data:	Setup:	Info:
Alert source	A list of available sources	Yes	Select the source of the alert. All available sources are presented in a source list. One or more alerts can be connecting to the same source.

Table 23. Condition

Name:	Data:	Setup:	Info:
Source condition	A list of available conditions	Yes	Select the condition of the source. All available conditions are presented in a condition list.

Table 24. Alert minimum interval time

Name:	Data:	Setup:	Info:
Triggering interval time	32-bit value	Yes	The time that specifies minimum triggering interval time between two SMS alert messages.

Table 25. Recipient's numbers in international format

Name:	Data:	Setup:	Info:
Recipient's number 1	Number 1 string	Yes	Set Recipient's number 1
Recipient's number 2	Number 2 string	Yes	Set Recipient's number 2
Recipient's number 3	Number 3 string	Yes	Set Recipient's number 3
Recipient's number 4	Number 4 string	Yes	Set Recipient's number 4
Recipient's number 5	Number 5 string	Yes	Set Recipient's number 5

Select all the text fields that you want to see in received SMS alert message.

Table 26. Alert text field

Name:	Data:	Setup:	Info:
Alert name text	Check button	Yes	Select alert name
Source state	Check button	Yes	Select source state
User defined text	Check button	Yes	Select user defined text. Maximum 115 characters.

Table 27. Select the alert status

Name:	Data:	Setup:	Info:
Select alert status	Check button	Yes	Enable/disable the trigger of the alert

### 4.1.3.2 NETSCAN mode page (only in option R)

Network scan allows perform a quick survey through both GSM900 and DCS1800 or DCS1900 bands (full band scan) without SIM card. The network scan starts in controller startup and writes the results of the scan to the network scan log file. Normal scanning time is about 2 - 5 minutes depending the number of the available carrier signals. The current log file is overwritten in new scan start. Working in modem NETSCAN mode.

Netscan log file:

Table 28. Netscan log file

Name:	Info:
Netscan log file	Latest netscan log file

Netscan info table:

The format information of the network scan log file is presented on the Table 29. Most important fields are received level and mobile country/network code. Network codes in Finland (country code 244) are: Elisa 05, Sonera 91, Telia 03 and Finnet 09.

Table 29. Netscan info table

Parameter name:	Parameter info:
arfcn (BCCH-carrier)	Carrier assigned radio channel
bsic (BCCH-carrier)	Received level (in dBm)
ber (BCCH-carrier)	Bit error rate (in %)
mcc (BCCH-carrier)	Mobile country code
mcn (BCCH-carrier)	Mobile network code
lac (BCCH-carrier)	Localization area code
cellId (BCCH-carrier)	Cell identifier
CellStatus (BCCH-carrier)	Cell status
NumArfcn (Cell Allocation)	Number of valid channels
arfcn (Cell Allocation)	arfcn-list
NumChannels (BCCH Allocation)	Number of valid channels
array (BCCH Allocation)	arfcn-list
arfcn (non BCCH-carrier)	RF channel
level (non BCCH-carrier)	Received level (in dBm)

#### 4.1.3.3 5.1.3.3 GPRSCON mode page (only in option R)

GPRS connection to remote server:

Set up parameters for the remote server connection. In typical case the controller connects to ClearScada server via public Internet (GPRS gateway). After connection the server exchanges GPRS packets with ClearScada server. Working only in modem GPRSCON mode. See chapter 6.3 for details.

Table 30. Target server parameters

Name:	Data:	Setup:	Info:
IP address or domain name	Address string	Yes	Target server IP address or domain name
Socket protocol type	TCP/UDP	Yes	Protocol type to be used in connection. Only TCP connection is supported at this time.
Socket port number	16-bit value	Yes	Target server port number.
Socket inactive timeout	16-bit value	Yes	Socket inactive timeout in seconds.

Name:	Data:	Setup:	Info:
			Timeout value sets the maximum time that the controller waits without data exchanged on the socket before connection restart. No timeout value is used in default.

#### 4.1.4 Logger Page (only in option R)

##### Memory card:

Memory card is used in logger systems. All micro Secure Digital (SD) compatible memory cards from 32MB to 2GB are supported. File system type is FAT (FAT12/16/32 for read and write, only FAT16 for format). Memory card is automatically initialized and mounted to the system in controller startup.

**Note! If you want to remove memory card, you have to disconnect the card first manually. On the fly card removal damage the FAT file system in the card.**

Table 31. Memory card information

Name:	Data:	Setup:	Info:
Status	Connected/Disconnected	No	Show the connection status of the memory card.
File System	FAT12/16/32	No	Shows file system type of the connected memory card. Only FAT12, FAT16 and FAT32 are supported.
Size in MB	32-2048	No	Memory card capacity in Mbytes.

Table 32. Memory card manager

Name:	Info:
Connect a media	Initialize and mount a memory card.
Disconnect a media	Uninitialize and Unmount a memory card
Format a media	Format the memory card to the FAT16 format. Formatter supports only FAT16 format.

### Loggers

Add, edit and delete logs. Maximum log count is limited to ten.

Table 33. Logs

Name:	Data:	Setup:	Info:
Add a new log name	Log name	Yes	Add new log to the logger system
Select the log to be edit	Log list	Yes	Edit the selected log
Select the log to be clear	Log list	Yes	Clear the selected log

#### 4.1.4.1 Logger manager page (only in option R)

Edit a selected log.

Table 34. Log name

Name:	Data:	Setup:	Info:
The Log to be edit	Name string	No	Show a log name to be edited

Table 35. Log restart

Name:	Info:
Remove/create log file	Log restart. Remove old and create new log file

Table 36. Log source

Name:	Data:	Setup:	Info:
Log source	Source list	Yes	Select the source for the log. All available sources are presented in a source list. One or more logs can be connecting to the same source.

Table 37. Log main header

Name:	Data:	Setup:	Info:
Set source gain	Gain string	Yes	Define source gain for a log header
Set source offset	Offset string	Yes	Define source offset for a log header
Set source unit	Unit string	Yes	Define source unit for a log header

Table 38. Log extra sources

Name:	Data:	Setup:	Info:
Show time	Check box	Yes	Show time in header
Show date	Check box	Yes	Show date in header
Service code	Check box	Yes	Show service code in header
Reject count	Check box	Yes	Show reject count in header
Missing nodes count	Check box	Yes	Show missing nodes in header

Table 39. Log update rate

Name:	Data:	Setup:	Info:
Update rate in seconds	10-3600	Yes	Set update rate for the log. Defines when the system writes the states of the source/sources to the selected log file.

Table 40. Log status

Name:	Data:	Setup:	Info:
Select log status	Select	Yes	Enable/disable log. Enable/disable the writing to the selected log file

### 4.1.5 Special Page

#### IP camera block

Linking Ethernet IP camera still picture to the MIC web page.

Table 41. IP camera parameters

Name:	Data:	Setup:	Info:
IP camera address	Address string	Yes	Hyperlink to IP camera image location. Full address path with image name.

## 4.2 Telnet interface

### 4.2.1 Overview

Telnet session is used as management tool for MIC-LIN and -IO modules configuration.

### 4.2.2 Connection

Embedded Telnet server listens to the port number 23. Telnet client software and Ethernet connection is required for Telnet session. Default IP address of the system is 192.168.1.13. Only one Telnet session is available at the same time.

### 4.2.3 Main menu

Telnet session starts in the main window. Main window menu structure is presented on the Table 42.

Table 42. Telnet main window

Command:	Parameter 1:	Parameter 2:	Information:
ACK	-	-	Acknowledges and clears a message See chapter 4.2.3.1 for details
BYE	-	-	Log out Telnet session
CLEAR (C)	n	-	Clear output of group n
ECHO	ON	-	Set command echo off
ECHO	OFF	-	Set command echo on
GET	-	-	Dumps network configuration See chapter 4.2.3.2 for details
HELP (?)	-	-	Print menu message
CONFIG	-	-	Enter network configuration menu. See chapter 4.2.3.3 for details
IN (I)	n	-	Read group n input
INFO			Prints general info
INIT	-	-	Reset the whole system
OUT (O)	n	d	Sets the output of group n to d
PUT	-	-	Load network configuration See chapter 4.2.3.2 for extra details.
SET (S)	n	-	Sets the output of group n
STEP	DOWN	n	Step dimmer group n down
STEP	UP	n	Step dimmer group n up

#### 4.2.3.1 ACK command

Some network groups can generate acknowledges to the console. This command clears the acknowledge message from the groups. Old acknowledges message has to be clear before new acknowledge message can presents to the console. See network group type manual for details.

#### 4.2.3.2 GET and PUT commands

GET dumps current network configuration data from a system memory to the screen. The print format consists of lines of ASCII characters. The first character of a line determines the interpretation of the line. This document applies to save file version 2. A semicolon initiates a comment: everything from the semicolon until end of line is ignored. Empty lines are allowed. The default number base is decimal. Use captures text option of telnet client if you want to create a network configuration backup file. Restore the system from the file to send backup file to the system after PUT command.

Network configuration data structure is presented on the Table 43.

Table 43. GET/PUT file structure

Command:	Parameter 1:	Parameter2:	Information:
V	n	-	Protocol version (now 2)
M	n	-	Frame length n
G	i	t	Group i of type t
M1	i	n	MasterON / sole master group n for slave group i
M0	i	n	Master OFF group n for slave group i
N	i	g	Node i in group g
D	i	t	Group i special value t
E	-	-	End of description

#### 4.2.3.3 CONFIG command

There are maximum tree configuration sub menu levels available: Linet network, local network and IP address configuration menu. The number of available menus depends on current module stack configuration. All possible menus are presented on the Table 44.

Table 44. Configuration menus

Command:	Name:	Information:
1	Configure Linet network	Linet network configuration (full range network)
2	Configure local network	Local network configuration (short range network)

Command:	Name:	Information:
3	Network status	Network status (all networks)
4	Configure IP address	Change system IP address

#### 4.2.4 Configuration sub menus

##### 4.2.4.1 Configure Linet network

Linet network menu provides full access to Linet network configuration. Status and debug commands are also available. All Linet network configuration sub menus are presented on the Table 45 and Table 46.

##### Configure Linet network sub menu:

Table 45. Configure Linet network sub menu

Command:	Name:	Information:
1	Add a new Linet node	Add a new Linet node to network
2	Delete a Linet node	Delete a Linet node from network
3	Set group master control	Select master and slave group/groups (See chapter 5)
4	Configure node properties	Enable/disable node properties
5	Set frame size	Select suitable frame size for current network
6	Save net configuration	Save all controller parameters to nonvolatile memory
7	Restore net configuration	Restore network configuration
8	Delete all network connections	Delete all network groups (no node addressed)
9	Set group special value	Set group special value (See chapter 5)
A or a	Network debug	Available network debug options

##### Add new Linet node sub menu:

Table 46. Add a new linet node sub menu

Command:	Name:	Information:
1	Add to a new group	Add a new Linet node to a new group
2	Add to an existing group	Add a new Linet node to a existing group

**Add to a new group sub menu:**

Table 47. Add to a new group sub menu

Command:	Name:	Information:
1	Add to a new Toggle group	See chapter 5.1 for details
2	Add to a new Dimmer group	See chapter 5.2 for details
3	Add to a new I/O group	See chapter 5.3 for details
4	Add to a new Lamp group	See chapter 5.4 for details
5	Add to a new Lamp mon group	See chapter 5.5 for details
6	Add to a new Delay group	See chapter 5.6 for details
7	Add to a new Data exch group	See chapter 5.7 for details
8	Add to a new Data 8 group	See chapter 5.8 for details
9	Add to a new Data 12 group	See chapter 5.8 for details
A or a	Add to a new Data 16 group	See chapter 5.8 for details
B or b	Add to a new A/D state group	See chapter 5.9 for details
C or c	Add to a new D12M2SS group	See chapter 5.11 for details
D or d	Add to a new SPU group	See chapter 5.12 for details
E or d	Add to a new I/O delay group	See chapter 5.13 for details
F or f	Add to a new Master delay group	See chapter 5.14 for details

**Configure node properties sub menu:**

Table 48. Configure node properties sub menu

Command:	Name:	Information:
1	Configure AD-module	Enable/disable AD-module option of the node
2	Set backlight intensity	Select back light intensity level of the node

**AD-module configuration sub menu:**

Table 49. AD-module configuration sub menu

Command:	Name:	Information:
1	Enable AD-module	Enable AD-module option of the node
2	Disable AD-module	Disable AD-module option of the node

**Back light intensity sub menu:**

Table 50. Back light intensity sub menu

Command:	Name:	Information:
1	Back light off	Set back light option of the node off

Command:	Name:	Information:
2	Low intensity level	Select low intensity level for the node
3	Medium intensity level	Select medium intensity level for the node
4	High intensity level	Select high intensity level for the node

#### Set frame size sub menu:

Table 51. Set frame size sub menu

Command:	Name:	Information:
1	50	Frame size for 50 nodes. Static network speed 320bits/s.
2	100	Frame size for 100 nodes. Static network speed 160bits/s.
3	200	Frame size for 200 nodes. Static network speed 80bits/s.

#### Restore net configuration sub menu:

Table 52. Restore net configuration sub menu

Command:	Name:	Information:
1	Restore from active save	Restore network configurations from active save locations
2	Restore from backup save	Restore network configurations from backup save locations

#### Network debug sub menu:

Table 53. Network debug sub menu

Command:	Name:	Information:
1	Set debug data	Set debug data
2	Set debug command	Set debug command
3	Identify node	Resolve node address and group
4	Program node	Program node address
5	Unprogram node	Unprogram node address
6	Set node configuration	Set node configuration
7	Display debug data	Display debug data
8	Clear node addresses and delete connections	Clear all nodes addresses and delete all connections permanently

Command:	Name:	Information:
9	Clear reserved node addresses	Clear all reserved node addresses

#### Set debug data sub menu:

Table 54. Set debug data sub menu

Command:	Name:	Information:
1	Set service frame	Set service frame
2	Set service code	Set service code
3	Set service data	Set service data
4	Set configuration data	Set node properties

#### Set debug command sub menu:

Table 55. Set debug command sub menu

Command:	Name:	Information:
1	Set service data	Set service data
2	Set configuration data	Set configuration data
3	Set service command	Select service command from menu
4	Clear address	Clear Linet IC address
5	Clear memory	Clear Linet IC memory
6	Read memory	Read Linet IC memory
7	Write memory	Write Linet IC memory
8	Set PWM on	Set node PWM on (100hz)
9	Set PWM off	Set node PWM off (100hz)
+	Increment PWM	Increment pulse width
-	Decrement PWM	Decrement pulse width

#### Set service command sub menu:

Table 56. Set service command sub menu

Command:	Name:	Information:
1	None	Set all node outputs low
2	Lamp test	Set all node outputs high
3	Data inhibit	Disable serial data of node
4	Loop data	Loop data from node output to node input

### 4.2.4.2 Configure Local network

IO modules have factory prepared module address (I2C). These addresses must be unique in one MIC installation. Please ref. to MIC module documents for addressing details. IO module reserves ten sequential group numbers and ten node addresses. This menu is presented only if there are one or two IO-modules currently connected in the stack. All available menus for IO module/modules are presented on the Table 57-Table 59.

#### Configure local network sub menu:

Table 57. Configure local network sub menu

Command:	Name:	Information:
1	Add a new IO module	Add a new IO module to network
2	Delete a IO module	Delete a IO module from network

#### Add a new IO module sub menu:

Table 58. Add a new IO module sub menu

Command:	Name:	Information:
1	IO module 1	Add a IO module 1
2	IO module 2	Add a IO module 2

#### Delete an IO module sub menu:

Table 59. Delete an IO module sub menu

Command:	Name:	Information:
1	IO module 1	Delete a IO module 1
2	IO module 2	Delete a IO module 2

### 4.2.4.3 Net status

Network status menu for the both networks.

#### Net status sub menu:

Table 60. Net status sub menu

Command:	Name:	Information:
1	Show connection status	Show network status string and

Command:	Name:	Information:
		a count of presents nodes, connected groups and missing nodes.
2	Display group data	Display group input value. Select group ID number and presses enter.
3	Show missing nodes	Show all missing node IDs

#### 4.2.4.4 Configure IP address

The system IP address is 192.168.1.13 in default. User can change the IP address with this command. The new IP-address become valid after next hardware reset.

### 4.3 Service interface

Interface similar to Telnet connection is available in the optional serial port connection. Static baud rate for RS-232 connection is 19200 bit/s, 8-data bit/s without HW or SW flow control.

### 4.4 SMS interface (only in option R)

#### Overview

User can control and monitor all the groups of the MIC with SMS messages. Arriving SMS messages are executed in a SMS command parser of the MIC. After executing the message the MIC returns one SMS acknowledge message to the message sender.

#### Configuration

The basic modem parameters have to set up before MIC can receive SMS messages from users. SMS interface working only in modem SMS/CSD mode.

#### Interface protection

Users number protection option allows to set up user mobile phone numbers that are free to access the system. Messages from all other mobile phone numbers are denied. See a chapter 4.1.3.1 for configuration.

### Supported commands

Supported SMS commands are presented on the Table 61.

Table 61. Supported SMS commands

Description:	Command:	Parameter 1:	Parameter 2:
Set group value	G or g	1-200 (group nro)	16-bit value
Get group value	G or g	1-200 (group nro)	Question mark

### Simple example:

1. Set value 123 to group 1: "G1 123"
2. Get the value of group 1: "G1 ?"

### Multiple commands

User can use multiple commands in a SMS message to be sends to the MIC. Maximum numbers of the commands are limited to ten commands (and 160-characters max). The command separator is “;” or “;”.

### Simple example:

Two set and get commands: “G1 234, G1 ?, G5 234, G9 ?”

## 5 Linet group types

### 5.1 TOGGLE

Toggle is a boolean group type with allowable group values from 0 to 1. Toggle group node uses one digital input and one digital output. There can be up to 200 nodes configured in one toggle group.

The state of the toggle group is common to all the nodes within the same group. Toggle group changes (i.e. toggles) it's state whenever a falling edge is detected in node's switch input. Group value can also be written from the other user interfaces, like console, and in that case this new output value will be immediately written to the node's output. When the group read is performed from the user interface, the returned value will be either 0 or 1, depending it's current state.

Toggle group can act as a master for the Lamp group.

Typical toggle group applications are for example lightning control systems.

*Toggle group configuration:*

Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Toggle group

### 5.2 DIMMER

Dimmer group produces Pulse Width Modulated output that is common for each node within the same group. Dimmer group node uses one digital input and one digital PWM output. There can be up to 200 nodes configured in one dimmer group.

The PWM frequency is approximately 100 Hz and duty cycle consist of 64 possible steps. Dimmer group state can be controlled by pressing the node push buttons or via other available interfaces, like console.

If the push button interface is used, the short press will toggle the dimmer group state between ON and OFF. On every transition from ON to OFF, the duty cycle will be set at the level of 50%. Consistently when the push button is held down for a longer period, the dimmer group will vary it's duty cycle. Duty cycle change direction will be changed at each long press.

When the console or the UDP interface is used, it is possible to control the group state and also control the group PWM duty cycle. State between ON and OFF can be changed by writing either 0

or 1 for the group. When a read operation is performed, the returned value will be 0 or 1, depending on the current group state.

From the console interface it is possible to increment the duty cycle by the following way (let's suppose that our dimmer group is number 4):

*One step increment:*

+4

*One step decrement:*

-4

*Multiple step increment (e.g. 25 step increment):*

+4 25

*Multiple step decrement (e.g. 10 step decrement):*

-4 10

New ways to control the dimmer group duty cycle added  
(see *lic\_dimmer\_controls.pdf*)

See UDP interface documentation for the dimmer UDP controls.

Dimmer group can act as a master for the Lamp group.

Typical dimmer group applications are for example lightning and process controls.

Dimmer group configuration:

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Dimmer group*

### 5.3 IO

I/O group node uses one digital input and one digital output.

Input and output directions are totally independent and have no correlation between themselves.

There can be up to 200 nodes configured in the I/O group. In case that several nodes are configured in the same IO group, the group nodes will share the common output value. Group common input value consist of logically OR'ed group node input values.

On group read, the current input value is returned (0 or 1). On group write the new output value is written.

I/O group can act as a master for the Toggle and Dimmer groups.

I/O group is typically used in setting and detecting applications.

*I/O group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new I/O group*

## 5.4 LAMP

Lamp group is an alert group, which can have up to 200 nodes configured in the same group. Group generates an alarm message in the console screen when any of the group nodes detects a low state in their inputs that lasts at least about one second. Alarm has to be acknowledged from the console before the other alarm messages will be shown.

Normally lamp group node uses only the input direction to recognize alerts, but when a toggle master is added for this group type, the output of the group node then depends on this toggle masters state. Lamp group does not support any direct group read or writes.

Lamp group can act as a master for the Lmon group.

Lamp group is typically used in applications where an alert message is needed to indicate a fault situation.

*Lamp group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Lamp group*

## 5.5 LMON

Lamp monitor group can be used as extension for the lamp group. Group type can have up to 200 nodes in the same group. When the lamp monitor group is configured as a slave for the lamp group, the lamp monitor group will observe the lamp group state and if the lamp fault situation happens, it will start toggling the outputs of its nodes. Toggling frequency will be visible (about 2Hz).

Only the output direction is used in Lamp monitor group node, and any direct read or write operations are prohibited for this group.

Lamp monitor group cannot act as a master.

Typical applications for the lamp monitor are visible alarm generations in case of fault situations.

*Lamp monitor group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Lamp mon group*

### 5.6 DELAY

Delay group provides a delay function for its digital outputs. Up to 200 nodes can be configured in the same Delay group. Delay time is specified in seconds and user can freely set this value (*Config -> Configure net -> Set group special*).

When value of 1 is written for this group, or the push button of the group node is pressed, the outputs of the group nodes will be set for the specified delay time, and after the delay time has expired, the outputs will be cleared. When the value of 0 is written for this group, the node outputs will immediately be cleared, despite the possible count down state.

When a group read operation is performed for the delay group, the returned value will be current delay time counter value. E.g. if there is 5 seconds left in the delay counter, the returned value will be 5.

Delay group cannot act as a master.

Delay group applications are for example stair lightning controls.

*Delay group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Delay group*

### 5.7 DATA EXCHANGE

Data exchange group exchanges raw data information between the nodes. The maximum node count for this group type is limited to two to be able to create a pair. The data is exchanged directly between the two nodes, so it is not possible to read or write group value from the controller.

Data exchange group cannot act as a master.

This group type is mainly be used for the debugging purposes.

*Data exchange group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Data exchange group*

### 5.8 DATA 8,12,16

Data 8 is a data group designed for sending and receiving byte wide information over the network. Respectively Data 12 and Data 16 are data groups designed for 12 bit and 16 bit wide data transactions. There can only be one node configured in each data group.

Each data group has an input value and an output value. Output value is the value that is constantly been sent to the group node. Input value is the value that is constantly been read from the group node. So on a group write, the new output value will be written. On a group read, the read input value will be returned.

Data 8 group frame format is the following:

**0 1 1 1 1 1 0** D7 D6 D5 D4 **0** D3 D2 D1 D0

Data 12 group frame format is the following:

**0 1 1 1 1 1 0** D11 D10 D9 D8 **0** D7 D6 D5 D4 **0** D3 D2 D1 D0

Data 16 group frame format is the following:

**0 1 1 1 1 1 0** D15 D14 D13 D12 **0** D11 D10 D9 D8 **0** D7 D6 D5 D4 **0** D3 D2 D1 D0

Where Dx represents the data bit number and **bold** bits are mandatory frame bits. So on every rising clock edge of the node's CLK pin one bit is transferred to the node and also one bit is read from the node.

Data groups cannot act as a master.

Data groups are typically used in all kinds of measurement and control applications where digital information needs to be transferred. Typical data group applications consist of a microcontroller attached to the Linet node. The microcontroller may receive some control commands via the Linet node, or the microcontroller could send for example measure data to the Linet controller via the node.

*Data 8,12,16 group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Data 8,12,16 group*

## 5.9 ADSTATE

A/D state group performs analog to digital conversions of its inputs. A/D state node uses one analog input and only one node can be configured in each a/d-state group. A/D converter resolution is 12-bit and it has an internal reference of 1.25V which corresponds the conversion value of 4095.

On group read, the conversion value will be returned. Group writes are prohibited. The frame format of the A/D state group is exactly the same as in Data 12 group.

A/D state group cannot act as a master.

Typical application for this group type is for example temperature measurements.

*A/D state group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new AD/state group*

## 5.10 CONTROL

Control group type acts as a thermostat. Control group node uses one analog input and one digital output. Only one node can be configured in each control group. Control group performs analog to digital conversion of its input and compares the result to the setpoint. If the conversion result is bigger than the setpoint, the output will be cleared. Similarly if the conversion result is smaller than the setpoint, the output will be set.

On group read the analog conversion value will be returned. On group write the new setpoint value is written.

Control group cannot act as a master.

Typical applications are heat control systems.

*Control group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Control group*

## 5.11 D12M2SS

D12M2SS group type as the name implies, is a abbreviation of the "Data 12 Master To Slaves's". This group delivers Data12 type information from one source node to multiple destination nodes.

Group type can have up to 200 nodes configured. First node within this group is considered as a source and the rest ones are considered as the destinations. Data that will be sent to the destination nodes is the input data of the first node. So for example if the a/d converter is enabled in the first node, the conversion result will be transmitted to all the destination nodes. On group read, the source node data value is returned.

Group write operations are ignored for this group.

D12M2SS cannot act as a master.

Typical application for this group type is information sending to multiple receivers.

*D12M2SS group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new D12M2SS group*

### 5.12 SPU

SPU is advanced thermostat group that can be used to display and control different types of processes, like room temperature. Group consist of one SPU-01 module, and one or more ON/OFF type modules to control the actuator. One PT1k sensor module (if temperature is controlled) is also needed to provide the measurement value to this group.

SPU-01 module works such way that user can set the desirable setpoint from the display by using the two push buttons. In normal operation the display will show the current measured temperature coming from PT1k and will enable or disable the output control groups depending on the setpoint and measured value. Each push of the buttons steps desired setpoint up or down and the value will be shown on the display for a short time. Display value can be selected to be either the temperature in degrees, or raw data value.

*SPU group configuration:*

To config SPU module proceed through the following steps.

1. Go to *Config -> Configure Linet network -> Add a Linet node -> Add to a new group -> Add to a new D12SPU group*
2. SPU group configuration must be done in order. The SPU module has two buttons, button 1 is the lefthand button and button 2 is the righthand button (display up).  
First push button 1, then button 2. After that, push the buttons one at a time from all of the I/O modules to be controlled by the SPU module (push buttons until controller responds).  
After SPU module and I/O module(s) are configured to the *same* SPU group, push backspace.

3. Configure the Pt1k module in a new Data 12 group. Go to *Add to a new group -> Add to a new Data 12 group*  
Push the button from the Pt1k module and then push backspace to finish.
4. Next go to *Config -> Configure Linet network -> Set group master controls*  
Push button from the SPU group. Notice that the SPU group becomes a slave group. Set master switch to Master ON. Then configure the Pt1k module to a master group. Now the SPU module is configured to receive data from Pt1k module.
5. Finally, there are some additional properties to be set for the SPU group. Go to *Config -> Configure Linet network -> Set group specials*  
Push a button from the SPU group.

Following options can be configured:

#### *Display mode*

Choose between the two display modes, either temperature mode (-99 to 99.9) or raw data mode (0 to 999)

#### *Trigger hysteresis*

Set the hysteresis for I/O group trigger (0 to 999)

#### *Trigger mode*

Choose either low level or high level trigger mode. ( 0 or 1)

### 5.13 6.13 IODELAY

I/O delay group is a mixture of I/O and Delay groups. It can have up to 200 nodes per group. I/O delay group node uses one digital input and one digital output.

When e.g. value 5 is written for this group, the group node outputs will be set for the 5 seconds and after that the outputs will be cleared. Group read operations will return the current output state, which is 0 or if triggered 1.

When the push button of the group node is pressed, the outputs of the group nodes will be set as long as the button is held down.

I/O delay group cannot act as a master.

Typical I/O delay group application is for example variable remote delay controls.

*I/O delay group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new I/O delay group*

### 5.14 MDELAY

Master delay group is kind of an Delay group, but this group can act as a master for the Toggle and Dimmer groups. Delay time for the group is defined in seconds and user can freely set this value (*Config -> Configure net -> Set group special*).

When the group node push button is pressed, or the value 1 is written to the group, the node outputs will be set for the specified time and when the time has passed the outputs will be cleared. If there is a slave configured for the Master delay group, the slave group will change it's state to ON or OFF whenever the Master delay group output is set. Control direction (ON or OFF) depends on the Masters configuration.

On group read, the current output value (0 or 1) will be returned.

Typical application for the master delay group is for example remote/local master controls for the Toggle or Dimmer groups.

*Master delay group configuration:*

*Config -> Configure net -> Add a Linet node -> Add to a new group -> Add to a new Master delay group*

## 6 Server interfaces

### 6.1 UDP interface

#### Overview

A UDP service is used to create Ethernet based monitoring and controlling link between the MIC and the server. Details for UDP connection are presented in [lic\\_udpif\\_0.0.3.pdf](#).

#### Addressing

The MIC uses one UDP port. The port number and IP address of the controller are configured during MIC setup. (Port 1313 and IP address 192.168.1.13 in default).

#### Packets

The MIC receives UDP-request packets from the port. A response packet is sent for each request packet. The response packet is sent to the IP address and ports marked as sender in the request packet. The MIC can response to multiple requesters. The requests are processed in sequence: a new request is processed only after the previous request is responded to. If the rate of requests exceeds to possible response rate, the extra requests are silently discarded.

### 6.2 Modbus interface

#### Overview

MIC Modbus interface supports currently three different Modbus commands (functions) which are "read input registers", "read holding registers" and "write single register". With read type commands, it is possible to read IO group states and correspondingly by a write command it is possible to write group states. Details for Modbus interface are presented in the [linet\\_modbus\\_v1.0.1.pdf](#).

#### Connection

Linet Modbus interface uses Ethernet network as a medium and Modbus data packets are been carried over the TCP-packets. So when connecting to Linet Modbus interface from the client, an ip address of a Linet controller needs to be known. Modbus port number used in Linet controllers is the same as the default Modbus port, which is 502. Only one active connection is supported at a time.

### 6.3 GPRS interface (only in option R)

#### Overview

GPRS services are used to create remote monitoring and controlling connection between the MIC and the remote server. Details for GPRS interface are presented in the lic\_gprsif\_0.0.1.pdf.

#### Connection parameters

Modem basic setup parameters, remote server IP address and port number has to configure before first connection. GPRS connection working only in a modem GPRSCON mode. Connection transfer protocol is TCP. See the chapters 4.1.3 and 4.1.3.3 for parameter configuration

#### Connection to the remote host server

After system startup the MIC tries to connect to the server with user defined IP address and port number. If the TCP connection socket can not create or connection socket dropped in any reason the MIC tries to reconnect again boundlessly.

#### Packets scheduling

Communication protocol bases on polling systems. After the MIC has created GPRS connection to the remote server it start to listening the connection socket and waiting request packets from the remote server. One response packet is sent for each received request packet.

#### Packet compression

RLE (Run Length Encoding) algorithm has been used in packet payload compression.

## 7 Diagnostic and ready LEDs

System diagnostic LED (red) indicates the status of the MIC. In normal the system diagnostic LED on a MIC-CPU module is powered off and all ready LEDs (green) on the any modules are powered on.

If the status of the MIC changed the diagnostic LED start to blink the valid diagnostic codes in continually. All supported diagnostic LED codes and ready LED's states are presented on the Table 62 in priority order.

Table 62. Diagnostic LED codes

Diagnostic codes (red):	Information:	Ready LEDs status (green):
Code1: 1, code2: 1	Nodes missing	MIC-LIN LED off, other LEDs on
Code1: 1, code2: 2	Network down	MIC-LIN LED off, other LEDs on
Code1: 1, code2: 3	Configuration mode active	MIC-LIN LED off, other LEDs on

Diagnostic LED blinking sequence: 5 second start delay, code 1 and then 2.5 second interval delay, code 2.  
-> 5 second start delay....

## 8 File System

### 8.1 File system type

File system of the MIC has designed for embedded system and small flash chips. The file type and structure is not compatible with known file systems.

### 8.2 File system size

Reserved size of the MIC file system is about 2/3 of a flash chip size. Supported flash chip sizes are 1MBytes to 8MBytes. Normal flash chip size on MIC-CPU module is 8MBytes.

### 8.3 Access to file system

User can access to the file system with TFTP. TFTP is simple file transfers protocol that makes possible read/write files from/to the file system of the MIC. Ethernet connection and TFTP-client is required for connection to TFTP server. Only binary transfer mode is supported. Next examples show how a user can **put** and **get** to files with TFTP client.

**Put example** for writing network configuration file with windows TFTP client.

Open windows command prompt, navigate to folder containing *net* file. Write `tftp -i 192.168.1.13 put net /system/net` at the command prompt (use your MIC IP) and presses enter key.

**Get example** for reading network configuration file with windows TFTP client.

Open windows command prompt. Write `tftp -i 192.168.1.13 get /system/net net` at the command prompt (use your MIC IP) and presses enter key.

### 8.4 Directories and files

#### 8.4.1 Root directory

Table 63. Initialization file

File name:	Information:
System.ini	Defines a file to be boot in controller startup

### 8.4.2 8.4.2 http directory

Table 64. HTTP main page

File name:	Information:
index.shtml	HTML version selection main page (full/lite)

#### 8.4.2.1 full directory

Table 65. HTTP full version pages

File name:	Information:
alerts.shtml	Alert manager page
gprscon.shtml	GPRS connection mode page
index.shtml	HTML version selection page
linet.css	Style sheet for all pages
linlogo.css	Si-Tecno logo picture
logger.shtml	Logger page
logs.shtml	Log manager page
modem.shtml	Modem page
netscan.shtml	Netscan mode page
network.shtml	Network page
nopage.shtml	Empty page
response.shtml	Response information page
smscsd.shtml	SMSCSD mode page
special.shtml	Special page
system.shtml	System page

#### 8.4.2.2 lite directory

Table 66. HTTP lite version pages

File name:	Information:
alerts.shtml	Alert manager page
gprscon.shtml	GPRS connection mode page
index.shtml	Html version selection page
linet.css	Style sheet for all pages
linlogo.jpg	Si-Tecno logo picture
logger.shtml	Logger page
logs.shtml	Log manager page

File name:	Information:
alerts.shtml	Alert manager page
modem.shtml	Modem page
netscan.shtml	Netscan mode page
network.shtml	Network page
nopage.shtml	Empty page
response.shtml	Response information page
smscsd.shtml	SMSCSD mode page
special.shtml	Special page
system.shtml	System page

### 8.4.3 bin directory

Directory for boot files.

Table 67. Controller boot files

File name:	Information:
linet.axf	Controller main execute file

### 8.4.4 System directory

Table 68. Settings files

File name:	Information:
net	Network configuration file
net_backup	Network configuration back-up file
settings	Systems settings file
rif_settings	MIC-RIF module settings file

#### 8.4.4.1 Settings file structures

Net files:

Network configuration files (net and net\_backup file) consist of the 1-200 group structures (one structure for one configured group). Fields of the one structure are presented in Table 69.

Table 69. Group field

Field name: (one field for one group)	Information:
Start label + GID	Start label and group ID number [GROUPn]

---

Field name: (one field for one group)	Information:
Gtype	Group type name. See chapter 5.
master_on	Master on group ID
master_off	Master off group ID
spcl_value	Group special value
item1, item2, item3...	Node number array of the group

Settings file:

General-purpose settings for MIC

Table 70. General-purpose settings structure

Field name:	Information:
Start label	[SETTINGS]
ip_address	System IP address
udp_port	UDP interface port
ser_bit_rate	Bit rate for serial connection
ser_parity_bit	Enable parity bit for serial connection
last_nid	Last node ID (frame size)
system_password	System password
ipcam_address	IP camera http link

MIC-RIF settings file:

Settings for MIC-RIF module

Table 71. Settings for MIC-RIF module

Field name:	Information:
Start label	[RIF_SETTINGS]
sim_pin	SIM PIN code
sim_puk	SIM PUK code
sms_service_centre_number	SMS service centre number
gprs_access_point_name	GPRS access point name
gprs_user_name	GPRS APN user name
gprs_user_password	GPRS APN user password
smtp_server_address	SMTP server address
smtp_user_name	SMTP user name
smtp_user_password	SMTP user password
modem_active_mode	Modem active mode

## MIC-01

Multi Interface Controller

PRELIMINARY!!!!!!

44 (46)

12.10.2007

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Field name:	Information:
csd_password_protection	GSM data call password protection
sms_user_number_protection	SMS user phone number protection
gprs_remote_server_address	GPRS remote server address
gprs_remote_socket_protocol	GPRS remote server socket protocol type
gprs_remote_socket_port	GPRS remote server socket port number
gprs_remote_socket_timeout	GPRS remote server socket inactive timeout
sms_user_number1	SMS user phone number 1
sms_user_number2	SMS user phone number 2
sms_user_number3	SMS user phone number 3
sms_user_number4	SMS user phone number 4
sms_user_number5	SMS user phone number 5

## 9 MIC software revision update in Windows environment

Ethernet connection and TFTP-client is required for update. Verify your Ethernet connection to the controller and check that MSDOS TFTP-client is founded on your computer. Copy the software update packet from Si-Tecno into your PC and check the files to be update. At first update the application file (linet.axf) and last the all web pages.

### 9.1 Required files and scripts

#### Files:

- **Linet.axf** (target binary file)
- **http folder** (includes all web pages)

#### Scripts:

- **linet.bat** (loads linet.axf file to the controller)
- **htmltoflash.bat** (loads all web pages to the controller)

### 9.2 Update application code

1. Edit controller IP address in linet.bat script file with text editor (save your changes)
2. Open MSDOS command prompt and navigate to the folder containing linet.bat file
3. Write **linet.bat** to the MSDOS command prompt and presses enter key
4. Wait for file transfer (this takes about 30 seconds)
5. Restart the controller

Note! Do not break software updating during file transfer. If the software updating failed it is possible that the controller can not start after next hardware reset.

### 9.3 Update all web pages

1. Edit all controller IP addresses in htmltoflash.bat script file with text editor (save your changes)
2. Open MSDOS command prompt and navigate to the folder containing htmltoflash.bat file.
3. Write the line **htmltoflash.bat** to the MSDOS command prompt and presses enter key
4. Waiting for file transfer (this takes about few minutes)

### 10 Related documents

Table 72. Related documents

Document name	Description
mic-cpu.pdf	MIC-CPU module product card
mic-lin.pdf	MIC-LIN module product card
mic-rif.pdf	MIC-RIF module product card
mic-io.pdf	MIC-IO module product card
SPU-01_info_eng.pdf	SPU-01 product card
lic_udpif_0.0.3.pdf	Linet UDP interface specification
linet_modbus_v1.0.1.pdf	Linet MODBUS interface specification
lic_gprsif_0.0.1.pdf	Linet GPRS interface specification