



# **CFM-34-E3**

## **Indoor Unit**

### **Management System Technical Description and Configuration Guide**

**Software Version 3.xx**

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# 1 Introduction

## *Proprietary notice*

The specifications or information contained in this document are subject to change without notice due to continuing introduction of design improvements. If there is any conflict between this document and compliance statements, the latter will supersede this document.

The following document is dedicated to the CFM series E3 Indoor Unit (CFM-34-E3) describing the built-in management system, configuration functionality, hardware features, etc.

The CFM-34-E3 Indoor Unit (IDU) is part of the CFM-LM series digital microwave radio link site, providing:

- Means of interconnecting Outdoor Unit (ODU or Radio) and user equipment;  
**The CFM-34-E3 IDU is intended for use with the CFM-LM series radios.**
- Local management functionality.

The CFM-34-E3 IDU provides the E3 interface, - the data transmission capacity is 34368 kbps and HDB3 line coding is applied. The interface is 75  $\Omega$  unbalanced, with BNC port connector(s).

This document covers versions **3.xx** of the management controller software for the CFM-34-E3 IDU. The most recent software version is **3.65**.

## Revision history

Revision	Date	Comments
1.0	November, 2003	
1.1	November, 2004	

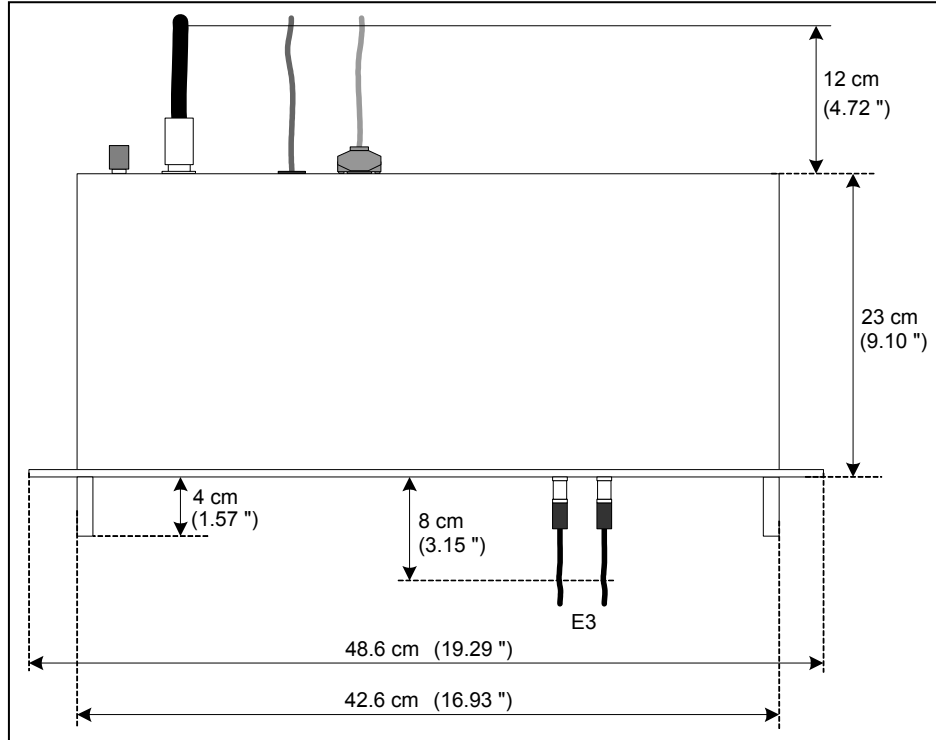
## 1.1 Applicable Standards

ITU-T G.703	"Physical/Electrical Characteristics of Hierarchical Digital Interfaces", 1991
ITU-T G.751	"Digital Multiplex Equipment Operating at the Third Order Bit Rate of 34,368 kbit(s) and the Fourth Order Bit Rate of 139,264 kbit(s) and Using Positive Justification", 1993
ITU-T G.823	"The Control of Jitter and Wander Within Digital Networks that are based on the 2048 kbit(s) Hierarchy", 1993
ITU-T G.775	"Loss of Signal (LOS) and Alarm Indication Signal (AIS) Defect Detection and Clearance Criteria", 1994

## 2 Indoor Unit Appearance

### 2.1 Installation Notes

The E3 IDU is implemented as 19" rack mountable aluminium 1U high unit, the depth of the unit is 230 mm without front panel handles and 270 mm with handles.



A maximum of 350 mm deep rack is required for the IDU to be mounted, from mounting points of front panel, including space behind the unit for cables to RF, Grounding point, Ethernet and Serial management interfaces. Roughly 10 cm to 12 cm of supplementary space is required (mainly depending on the RF cable type) behind the IDU for management interface cables and RF cable.

## 2.2 Hardware Features

The CFM-34-E3 IDU contains:

- E3 interface board;
- Management board;
- Power Supply module;
- Alarm relay module (optional);
- LCD and Keypad modules.

All the aforementioned boards and modules are interconnected with flat ribbon cables with snap-on connectors.

The CFM-34-E3 IDU has the following interfaces:

- Port to Outdoor Unit, (ODU), N-type Female connector;
- E3 port, 75  $\Omega$  unbalanced interface, BNC port connectors;
- RS-232 serial management port;
- 10Base-T Ethernet management port for Web or Telnet console, or SNMP trap manager;
- LCD/keypad;
- Traffic port and management port activity LEDs;
- Power connector.

## 2.2.1 Ports

Table 1. Ports

Front panel connectors	
Connector or label	Description
<b>+48V</b> (power socket)	Power connector, IDU should be powered from 20 – 60 VDC power source. Both "+" or "-" poles of the power source could be grounded, one should make sure if the chosen grounding wire is connected to ground on IDU power connector; see Figure 2.
<b>IN / OUT</b>	E3 interface port (BNC type connectors)
Rear panel connectors	
Connector or label	Description
RF, - N-type connector (female)	Radio Unit port; Use 50 Ω coaxial cable with N-type male connectors on both sides to connect the ODU to the IDU, such as RG-213, LMR-400 or equivalent; see Figure 1.
DB9 type connector	RS232 management port for connection of ASCII console or analog line modem (DB9 female type connector);
RJ-45 socket	10Base-T Ethernet management port for Web/Telnet terminal.
DB25 type connector	Alarm port. <i>This feature is optional.</i>

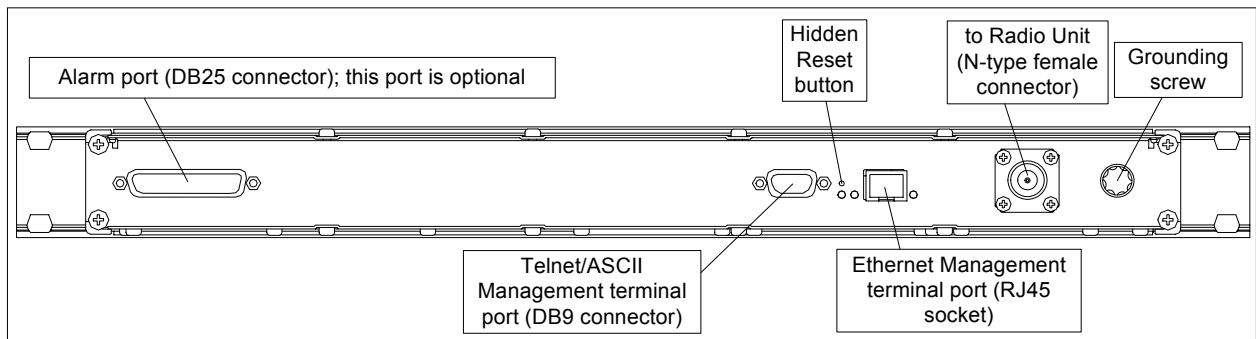


Figure 1. The rear panel of the CFM-34-E3 IDU



Figure 2. The front panel of the CFM-34-E3 IDU

## 2.2.2 LEDs

Table 2. Front panel LEDs

Label	Color	Description	
<b>RA</b>	<b>Red</b>	Radio Alarm LED indicates problems with ODU and IDU-ODU connection, this includes: <ul style="list-style-type: none"> <li>- Rx signal level lower the predefined value, - <i>Rx Alarm Level</i>, which is -71 dBm by default,</li> <li>- humidity level too high,</li> <li>- IDU-ODU cable not properly connected or damaged;</li> </ul> If not lit – operating properly. (Rx=OK & TxOut=OK & Humidity=Low & RF Cable=OK) The RA LED (RA alarm) will also switch on if the Radio loopback is switched on and/or the transmitter power is switched off. The RA LED is updated once per second.	
<b>SL</b>	<b>Red</b>	Red <i>Synch Lost</i> LED, indicates that false sync bit pattern has been received either in the E3 frame from the LAN side or in the E3 frame from the WAN side;	
<b>E3 port status LEDs</b>	<b>FRM and SN</b>	<b>Green</b>	The combination of these two LEDs display current operation mode of the E3 IDU: <i>FRM</i> and <i>SN</i> switched off – full mode (service channel available), <i>FRM</i> switched on, <i>SN</i> switched off – framed mode, <i>FRM</i> and <i>SN</i> switched on – unframed mode; For more information about E3 IDU operation modes see Chapter 2.3.
	<b>LAN</b>	<b>Yellow</b>	Indicates that false sync bit pattern in the E3 frame has been received from the LAN side.
	<b>WAN</b>	<b>Yellow</b>	Indicates that false sync bit pattern in the E3 frame has been received from the WAN side.
	<b>LB</b>	<b>Red</b>	<i>LoopBack</i> LED, indicates that the loop test (any) is set in the interface, for information about loop tests see Chapter 5.
	<b>ERR</b>	<b>Red</b>	When flashes up, indicates an error in the HDB3 code from the LAN side (bipolar violations)
	<b>LOS</b>	<b>Red</b>	<i>Loss of Signal</i> LED, - signal level is below the normal from the LAN side

Figure 3. The front panel of the CFM-34-E3 IDU

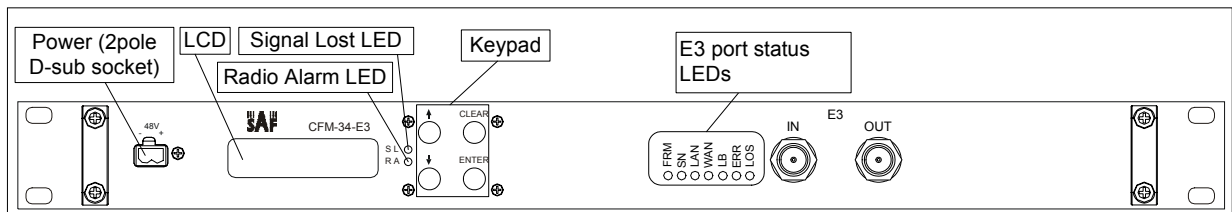


Table 3. Rear panel LEDs

LED	Description
<b>A</b>	If blinking (with a period of about 1 sec.), indicates operation of the management module CPU;
<b>B</b>	If lit, indicates that Ethernet link is established with the management terminal;
<b>C</b>	If blinking, indicates data interchange between the IDU and the management terminal;
<b>Note:</b> A, B and C correspondence to LEDs is shown in the figure below.	

The rear panel LEDs refer to the operation of Ethernet port on the management module board (A, B, C).

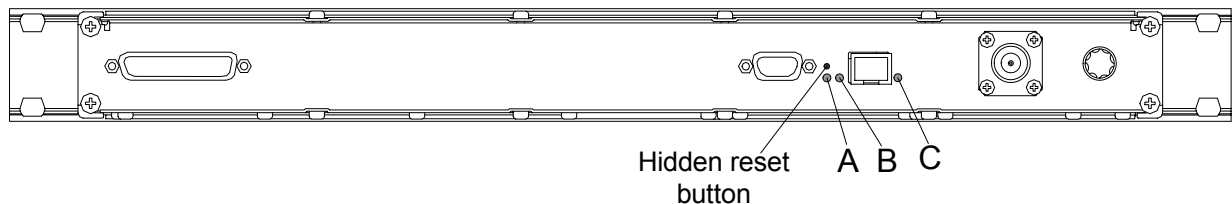


Figure 4. The rear panel LEDs

## 2.3 Operation Modes

The CM-34-E3 IDU can operate in the following modes:

- *Full mode* – this is the default operation mode which is used for carrying E3 traffic and enables service channel between near-end and far-end sites via radio channel; this operation mode is used for carrying E3 traffic where the **Sn** bit in each frame is not used by the hardware infrastructure interconnected with the radiolink, i.e., the Sn bit is used by the service traffic instead of E3 traffic, - the Sn bit is used to transmit service information between the sites of the hop. This is the only operation mode which enable service channel between near-end and far-end sites.
- *Framed mode* – this operation mode is used if E3 traffic (frames) are transmitted over the hop and the Sn bit in each frame is used by the hardware infrastructure interconnected with the radiolink; there is no service channel available between the sites while operating in this mode since the Sn bit is not used for service traffic;
- *Unframed mode* – in this mode the incoming signal from the LAN side is transparently transmitted on the WAN side without frame processing, this mode is used if other than E3-framed traffic is transmitted over the link; there is no service channel available between the sites while operating in this mode.

Switching between operation modes does not require to reboot the IDU, if the new configuration is intended to be permanent, the changes made should be saved in the configuration script by entering "write" command from Telnet or ASCII console or choosing "write config" in the LCD menu.

## 2.4 Labelling

The IDU label is found at the rear panel:

- P/N – product number, the last two numbers denote the product version;
- S/N – serial number.

The combination of product number and serial number uniquely identifies each unit.



Figure 5. Label of the CFM-34-E3 Indoor Unit

## 3 Management Interfaces

### 3.1 LCD/Keypad

LCD and keypad provides most basic method to locally configure and monitor the local CFM terminal (IDU+ODU).

LCD display is constantly backlight and is able to display 2 lines of 16 symbols in each line.

LCD operates in two modes, "**Status display**" and "**Setup**", please refer to Flow Chart 1, page 32.

Keypad consists of 4 buttons:

**ENTER** is used to confirm the choice of displayed item or entered data as well as to switch from "*status display*" to "*setup*" mode.

**CLEAR** is used to cancel the choice or to move to previous menu level

↑ ↓ Up/Down buttons are used:

- To switch between options for menu items displayed

- To choose parameter to set up and to set its value.

#### 3.1.1 "Status Display" Mode of the LCD Management Interface

Once the IDU is powered up, it automatically enters "Manual Display" mode, displaying two parameters at a time statically (use up/down buttons to scroll through parameters). These parameters are listed in the Table 4.

Table 4. Parameters displayed in "Status Display" mode

Parameter	Values and description
<b>Tx=23362.5MHz</b>	Parameter indicates Tx frequency of the Radio.
<b>Rx=22354.5MHz</b>	Parameter indicates Rx frequency of the Radio.
<b>TxPower=+15dBm</b>	Parameter indicates Tx power of the Radio.
<b>Rx=OK</b>	Rx parameter indicates various states of IDU receiver and ODU: <b>"OK"</b> indicates IDU receives acceptable signal from ODU; <b>"Low"</b> indicates received signal level is too low for IDU to operate properly; <b>"Error"</b> indicates internal fault in ODU receiver, please contact sales representative or manufacturer; <b>"Loopback"</b> indicates radio loopback mode: Rx = Tx frequency
<b>RxLev=-66dBm</b>	Parameter <b>RxLev</b> indicates level of the received signal, values from -40 dBm to -90 dBm provide proper operation of the system.
<b>Cable=-5 dB</b>	Parameter indicates signal attenuation in ODU-IDU cable, values of 0 ... -20 dB provide proper operation of IDU.
<b>TxOut=Ok</b>	Parameter indicates operation status of ODU transmitter: <b>"Ok"</b> indicated proper operation; <b>"Error"</b> indicates internal fault in ODU transmitter, please contact sales representative or manufacturer.
<b>TxPLL=Ok</b>	Parameter indicates operation status of ODU Tx Syntheser Loop (PLL lock): <b>"Ok"</b> indicated proper operation; <b>"Error"</b> indicates internal fault in ODU transmitter, please contact sales representative or manufacturer.
<b>RxPLL=Ok</b>	Parameter indicates operation status of ODU Rx Syntheser Loop (PLL lock): <b>"Ok"</b> indicates proper operation; <b>"Error"</b> indicates internal fault in ODU receiver, please contact sales representative or manufacturer.
<b>t= 23C</b>	Indicates ODU internal temperature
<b>Humidity=Low</b>	Parameter indicates humidity level inside ODU, <b>"Low"</b> indicate acceptable moisture levels; <b>"High"</b> indicate too high level of humidity, condensing.
<b>Restart=00</b>	Parameter indicates number of ODU management controller restarts since counter was reset on power up.
<b>IDU t= 31C</b>	Parameter indicates temperature inside IDU.
<b>RF Cable – OK</b>	Parameter indicates power consumption of the ODU unit: <b>"OK"</b> indicates acceptable level; <b>"Short"</b> indicates short circuit in cable; <b>"Off"</b> indicates too low power consumption by ODU. This is most likely due to the brake in the cable. If the cable is intact, the ODU is faulty.
<b>RxAlarmLev =-77</b>	Indicates the Rx level (in dBm) at which the Radio Alarm is switched on.
<b>UpTime=5371</b>	Indicates the system up-time in seconds.
<b>DownTime=4</b>	Indicates the system down-time (when SL alarm is on) in seconds.
<b>BBLoopback=OFF</b>	Indicates if the base-band loopback is switched on or off.
<b>PW max =19</b>	Indicates the maximum transmitting power for current ODU.

### 3.1.2 "Setup" Mode of the LCD Management Interface

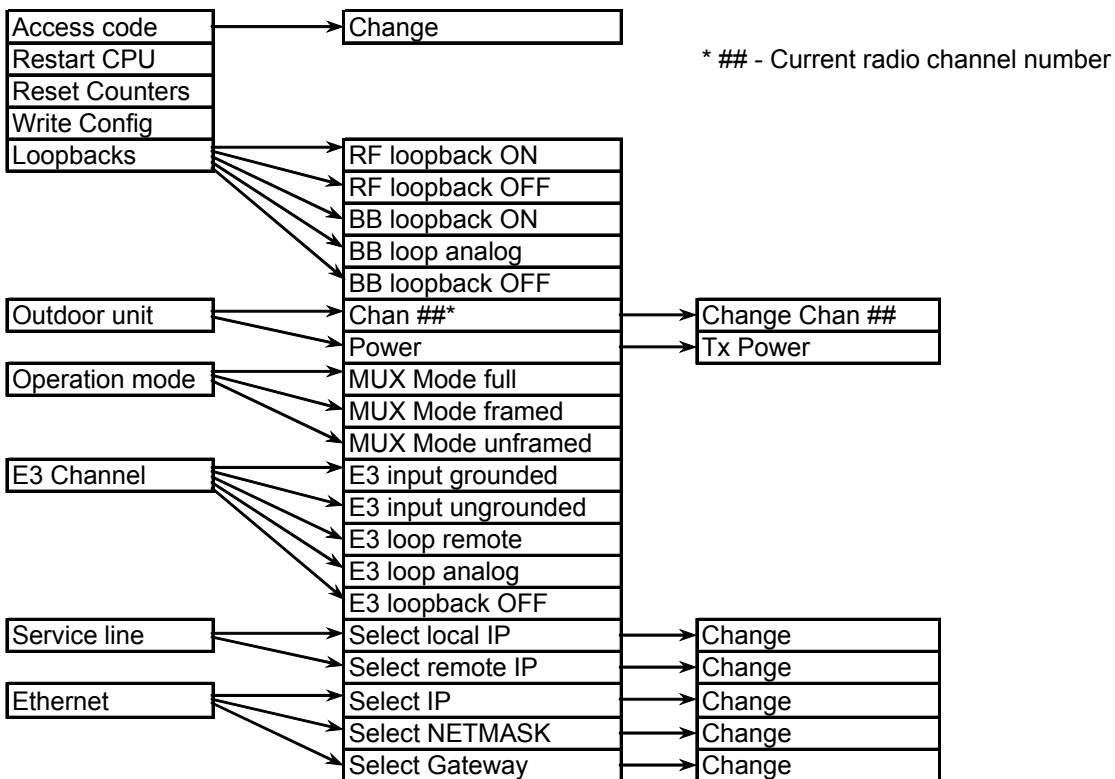
The following table describes parameters available for change from the IDU LCD in **Setup** mode. Algorithm of LCD operation is shown on Flow Chart 1, page 32.

Table 5

Parameter	Values and description
<b>Change Chan ##</b>	<p>"<b>Change Chan</b>" item provides ODU Tx and Rx frequency setup functionality:</p> <p>If this item is chosen LCD display shows, for example:</p> <pre>Change Chan 163 Tx=23583.000MHz</pre> <p>where "163" - currently used Tx channel number, and "Tx" - frequency appropriate to channel.</p> <p>Channel numbers and corresponding Tx/Rx frequency values are found in the document "<i>Channel plans</i>", see chapter 9.3 for details.</p> <p>Operator sets desired channel number scrolling through values with "Up" or "Down" buttons and confirming the choice with "Enter" button.</p>
<b>Tx Power +5dBm</b>	<p>"<b>TxPower</b>" parameter sets the ODU Transmitter power rate. The default setting is "OFF", allowing safe deployment of the equipment avoiding interference risk with other radio equipment.</p>
<b>Select local IP</b>	<p>Sets the IP address of the serial port of service channel for the local IDU management module (near-end terminal), see Chapter 3.5.</p>
<b>Select remote IP</b>	<p>Sets the IP address of the serial port of service channel for the remote IDU management module (far-end terminal).</p>
<b>Write config</b>	<p>Saves all settings in EPROM of management controller.</p>
<b>RF loopback OFF</b>	<p>Turns off the radio loopback, <b>RF loopback ON</b> - sets the radio loop.</p>
<b>BB loopback OFF</b>	<p><b>BB loopback OFF</b> - Turns off the baseband loopback (local), <b>BB loopback ON</b> - turns on the digital baseband loopback, <b>BB loop analog</b> - turns on the analogue baseband loopback; refer to chapter 5.1.1 for details.</p>
<b>Restart CPU</b>	<p>Restarts the management module CPU for new IP settings to take effect. Resets all management counters.</p>
<b>Operation mode full</b>	<p>Sets the operation mode of the E3 IDU:  <i>unframed</i> – transparent operation mode, no E3 routines are performed (e.g. synch-bit check), no service channel available,  <i>full</i> – operation mode for processing E3 traffic, the service channel is available while operating in this mode,  <i>framed</i> – operation mode for processing E3 traffic and with no service channel available.                      For more information about operation modes see Chapter 2.3.</p>
<b>E3 loop analog</b>	<p>Sets the loop in E3 interface:  <i>loop analog</i> – analog loopback,  <i>loop remote</i> – remote loopback (digital),  <i>loopback OFF</i> – resumes to normal operation.                      For more information about loop tests see Chapter 5.</p>

<b>E3 input grounded</b>	<i>grounded</i> - grounds the shield of the E3 input port, <i>ungrounded</i> - un-grounds the shield of the E3 input port.
<b>Select IP</b>	Default value - <b>192.168.205.010</b> or <b>92.168.206.010</b>
<b>Select NETMASK</b>	Default value - <b>255.255.255.000</b> <b>Important!: Do not enter address "255.255.255.255"</b>
<b>Select Gateway</b>	Default value - <b>255.255.255.255</b> (No gateway specified)
	<b>IP</b> (IP address), <b>Netmask</b> and <b>Gateway</b> parameters provide the means of addressing management board of IDU in order to control and manage IDU locally and monitor ODU both locally and remotely. Note: It is necessary to restart the management CPU for any changes in IP settings (including SNMP terminal and service channel IP settings) to take effect.
<b>Access Code</b>	Specify the panel access code (a number from 0 – 200) to enable any adjustments from IDU.
<b>Reset counters</b>	Reset up-time and downtime counters, for more information see page 20.

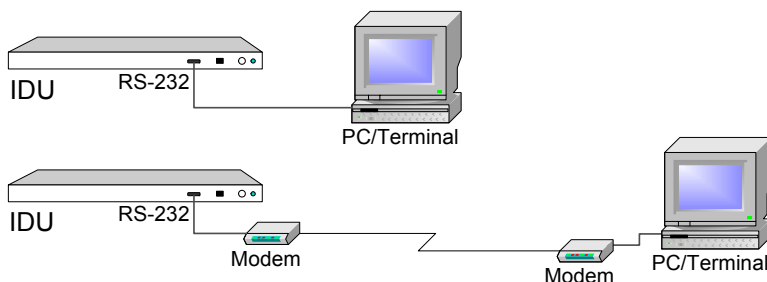
### Setup mode menu tree



## 3.2 RS-232 Serial Management Port

RS-232 serial management port of the IDU will provide terminal management via connected PC or other terminal device or modem.

The terminal connected to the serial management port provides the same management functionality as Telnet interfaces (refer to Chapter 3.2.1). In order to interconnect the IDU and the management terminal directly through serial ports, a straight through modem cable is needed. The serial port of the management terminal should be configured as 19200 8-N-1, no data flow control.



If using modems, the management terminal is connected with the IDU remotely through a telephone line. In this case the modem, *which is connected with the IDU*, should be configured as stated below:

- Auto answer on first ring ON
- Echo offline commands OFF
- Suppress result codes
- DTR override

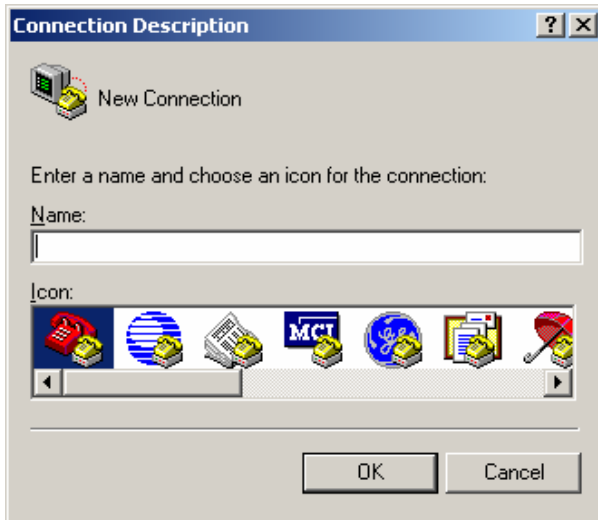
The modem configuration then should be saved (typically with AT&W string).

```
Telnet server. Press CTRL/D to end session
Login: telnet
Password:
T_15>?
Valid commands:
  enable chan ClearCounters disable disableWDT exit ip cfg
  mac E3 uset tset tget muxmode name ping odu
  panel resetWDT restartcpu rfloop RxAlarmLevel BBloop route snmp stat
  time txpower ver write webrefresh wwwuser telnetuser
T_15>stat
No data from ODU
RF Cable - OFF
RxAlarmLev ==-71
IDU t= 30C
UpTime=9
DownTime=7
BBLoopback=OFF
Framing Err=16
Signal Lost alarm = ON
Radio alarm = ON
T_15>
```

*Telnet/ASCII Console Command Interface*

In order to connect the PC to the RS232 management port using *Hyper Terminal* program (this program is included in any Windows version), proceed as described below.

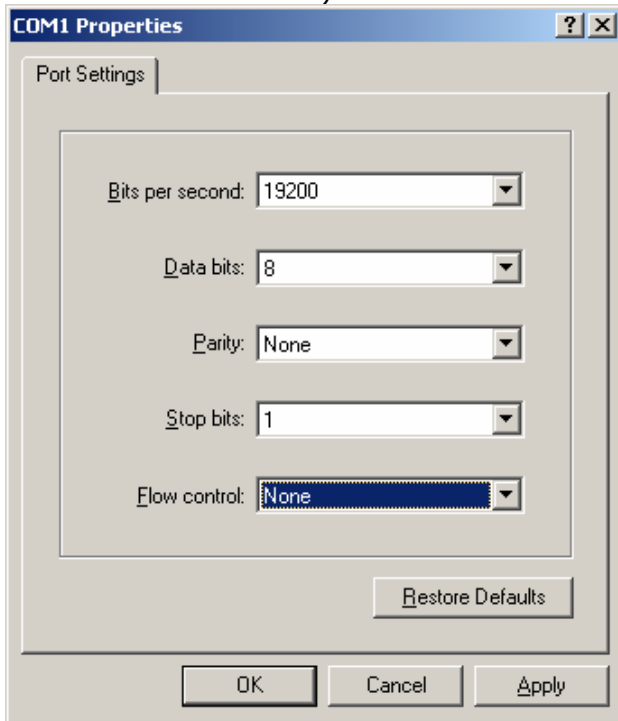
1. Connect PC to the RS232 serial port by means of "straight through" or modem serial cable (null-cable).
2. Run "Hyper Terminal" program.
3. Make a *New connection*, enter connection name.



4. Choose port (COM1 or COM2).



- Set port settings (bits per second: 19200, data bits: 8, parity: none, stop bits: 1, no data flow control).



- Press OK
- Press Enter. Password is disabled by default.  
If successfully connected, the prompt should appear as in the picture below; see Chapter 3.2.1 for available commands.



### 3.2.1 Command Line Interface for Telnet/ASCII consoles

The command line management interface offers the widest configuration and monitoring functionality. The following tables summarize all available commands for Telnet and ASCII management terminals.

Common commands	
Command	Description
<b>Time</b>	Show current date and time.
<b>Time</b> <YYYY-MM-DD HH:mm:ss>	Set the date and time on the IDU. Refer to section <i>Real-time clock</i> , page 22.
<b>Name</b> <deviceName>	Assigns a name to the IDU; The default name is "SAF". Refer to section <i>IDU name</i> , page 21.
<b>Write</b>	Save all settings in the EPROM. This command saves all current settings in EPROM, including those in the script.
<b>Ping</b> <IPaddress>	This command is for troubleshooting purposes to verify the service channel connectivity, - sends a special packet to the remote IDU and then waits for a reply.
<b>BBloop</b> {on   analog   off} [duration]	Set baseband loopback, "on" – set digital loopback (dual), "analog" – set analog loopback, "off" – resume normal operation. Duration can be from 1 to 10 minutes, the default duration is 1 min. Example: <i>BBloop on 3</i>
<b>RFloop</b> {on   off} [duration]	Set RF loopback, "on" – set loopback, "off" – suspend loopback. Duration can be from 1 to 10 minutes (equal to 1 min. by default). Example: <i>rfloop on 3</i>
<b>Webrefresh</b> <period>	Refreshes the contents of WEB interface with a period specified with <i>refreshperiod</i> parameter. The period is given in seconds; the minimum period is 2 seconds. Example: <i>webrefresh 5</i> – the web page will be updated after every 5 seconds.
<b>RxAlarmLevel</b> <alarmLevel>	Set the Rx signal level at which the Radio Alarm is switched on. For default value see Chapter 3.9. Example: <i>rxalarmlevel -55</i>
<b>DisableWDT</b>	Disable watchdog timer.
<b>ResetWDT</b>	Reset watchdog timer (restarts management controller, resets all management counters).
<b>ClearCounters</b>	Reset up-time and down-time counters, see page 20 for details.
<b>Exit</b>	Close Telnet session (same as to press Ctrl+D)
<b>Disable</b> {telnet   www   snmp   rip}	"telnet" – Disable Telnet interface "www" – Disable Web interface "snmp" – Disable SNMP interface "rip" – Disable RIP Note: after the command is entered, it is necessary to save the configuration in EPROM (use write command), and restart the IDU for changes to take effect.

Configuring security parameters	
Command	Description
<b>Enable password</b> <password>	Specify a password to prevent unauthorized access to the ASCII PC terminal (connected through RS232 serial port). Refer to section <i>Security commands</i> , page 21.
<b>Panel access</b> <accesscode>	Specify a password to prevent unauthorized configuration through the IDU management interface. The password can be a number from 0 – 200.
<b>WWWuser</b> <username> <password>	Specify a password (1 - 20 symbols) to prevent unauthorized access to the Web terminal.
<b>Telnetuser</b> <username> <password>	Specify a password (1 - 20 symbols) to prevent unauthorized access to the Telnet terminal.
<b>Enable rfweb</b> {yes   AnyString}	Enables configuration of ODU parameters (frequency, Tx power) from the Web terminal. In order to enable it, use "yes" with small caps; to disable use any string instead of "yes" argument except the empty string ("").

Configuring IDU parameters	
Command	Description
<b>RestartCPU</b>	Restart CPU of the management controller for the new IP settings to take effect. Resets all management counters.
<b>IP</b> addr <IPaddress>	Set the IP address of Ethernet management port (requires to restart the management module CPU). <b>Important!: Do not enter address "255.255.255.255"</b>
<b>IP</b> mask <IPnetmask>	Set the IP netmask of Ethernet management port (requires to restart the management module CPU).
<b>IP</b> gw <IPaddress>	Set the IP address of the default gateway to the service channel (requires to restart the management module CPU).
<b>IP</b> seraddr <IPaddress>	Set the IP address of the serial port of service channel for the local (near-end) IDU management module (requires to restart the management module CPU).
<b>IP</b> remaddr <IPaddress>	Set the IP address of the serial port of service channel for the remote (far-end) IDU management module (requires to restart the management module CPU).
<b>Route</b> add <destinationIPaddr> Mask [netmask] <gateway> [metric]	Add a static route to the routing table. The variable "metric" is set to 1 by default (requires to restart the management module CPU). Example: Route add 192.168.205.010 Mask 255.255.255.0 155.13.79.13 5
<b>Route</b> delete <destinationIPaddr> [netmask]	Delete a static route from the routing table (requires to restart the management module CPU).
<b>SNMP</b> community read <communityname>	Specify the SNMP community name of the agent to enable parameters to be read (not configured). The default community name to read parameters is <i>saf-public</i>
<b>SNMP</b> community write <communityname>	Specify the community name of the agent to enable parameters to be written (configured). The default community name for writing is <i>saf-private</i>
<b>SNMP</b> trap <IPaddress>	Set the IP address of the management terminal with the installed Trap Manager software, based on SNMP platform (requires to restart the management module CPU).
<b>E3 loop</b> {analog   remote   Off}	Switch on/off the analogue or remote loop of the E3 interface. Only one loopback can be active at a time, - when other is switched on, the current active one is switched off.
<b>E3 input</b> {grounded   ungrounded}	Set the shield grounding of <i>input</i> of the E3 port: <i>grounded</i> – the shield is grounded, <i>ungrounded</i> – the shield is not grounded. The <i>output</i> shielding is permanently grounded.
<b>E3 stat</b>	Display status list of the E3 channel.
<b>Mode</b> {full   framed   unframed}	Sets the operation mode of the E3 IDU: <i>unframed</i> – the incoming signal from the LAN side is transparently transmitted on the other side, this mode is used if other than E3 traffic is transmitted over the link; there is no service channel available between the sites while operating in this mode; <i>framed</i> – this operation mode is used if E3 traffic are transmitted over the hop and the $S_n$ bit within the frame is relevant to E3 traffic; there is no service channel available between the sites while operating in this mode since the $S_n$ bit can not be used for service traffic; <i>full</i> – this operation mode is used if E3 traffic are transmitted over the hop and the $S_n$ bit within the frames is not relevant to E3 traffic (not used by the hardware infrastructure interconnected with the radiolink); in this mode the $S_n$ bit is used to transmit service information between the sites of the hop enabling a service channel between the sites. For information about operation modes see Chapter 2.3.

Configuring ODU parameters	
Command	Description
<b>Chan</b> <channel#>	Set the ODU Tx and Rx frequency. Channel numbers and their corresponding Tx/Rx frequency values are found in the document "Channel plans", see chapter 9.3 for details.
<b>Txpower</b> {-10 -9 ... 0 +1 +2 ... +20  off}	Set the ODU Transmitter power [dBm]. The default setting is "OFF".

Verifying Configuration	
Command	Description
<b>Stat</b>	Show parameters, - lists all the parameters that are displayed in the status display mode of the IDU LCD.
<b>Mac</b>	Verify the MAC address of the Ethernet management port.
<b>Ver</b>	Show version of the IDU.
<b>ODU</b>	Show version of the ODU.

Commands for script editing	
Command	Description
<b>Cfg</b> show	Show the configuration script stored in RAM.
<b>Cfg</b> load	Load the configuration script from EPROM into RAM.
<b>Cfg</b> clear	Clear the script stored in RAM.
<b>Cfg</b> delete <stringNumber>	Clear a single string in the configuration script. This command is useful for script editing.
<b>Cfg</b> write	Save current script in EPROM. This command saves the current script and settings that are specified in it in EPROM.
<b>Cfg</b> factory yes	Reset the configuration by loading the script with default settings. This command performs the following actions (in the following order): <ol style="list-style-type: none"> <li>clears the current script from EEPROM,</li> <li>creates and stores in EEPROM the new script with the following settings: <ul style="list-style-type: none"> <li>IP addr 192.168.205.010 or 192.168.206.010</li> <li>IP mask 255.255.255.000</li> <li>IP gw – 255.255.255.255 (default gateway - none)</li> <li>IP seraddr – (SLIP configuration, - IP address of the local serial port)</li> <li>IP remaddr – (SLIP configuration, - IP address of the remote serial port)</li> <li>Enable rfweb yes (enable configuration from Web terminal)</li> <li>SNMP trap 255.255.255.255 (none)</li> <li>RxAlarmLevel &lt;#&gt; (# - default value, default value depends on IDU, see Chapter 3.9)</li> </ul> </li> <li>restarts the management controller</li> </ol>
<p>Syntactic notes:</p> <ul style="list-style-type: none"> <li>Commands are in <b>bold</b> font.</li> <li>All arguments (variables) are in <i>italic</i> font.</li> <li>Subcommands and keywords are in regular font.</li> <li>Arguments in square brackets ([ ]) are optional but required arguments are in angle brackets (&lt;&gt;).</li> <li>Alternative keywords are grouped in braces ( { } ) and separated by vertical bars (   ).</li> </ul>	

## General

The management module has RAM and EPROM chips onboard. When IDU is booted up or management module CPU is restarted, bootstrap is loaded from the EPROM into RAM. The bootstrap contains all the parameters that were previously stored in EPROM using **write** and/or **cfg write** commands. These parameters are stored in EPROM in the form of script and when booting up, the script parameters are loaded into RAM. These parameters can be freely changed thus changing the contents of RAM. If the IDU is shut down without saving the current configuration in EPROM, the original configuration is restored from EPROM on the next boot-up. Here is an example of script:

```
SAF>cfg show
01: ip remaddr 192.168.0.11
02: ip seraddr 192.168.0.10
03: Chan 5
04: snmp community read safpub
05: snmp trap 255.255.255.255
06: route add 62.85.14.0 MASK 255.255.255.0 192.168.12.22
```

The script can be edited, e.g., strings can be added by simply entering the required command (the script will be supplemented with the new string or the instant string entry will be updated) and deleted using "**cfg delete** <string#>" command line. The changes of parameters can be saved in EPROM using **cfg write** command line. To end Telnet/ASCII session press Ctrl+D.

The management software has a system up-time and down-time timer functionality built in. The downtime counter counts the seconds when the *Synch Lost* alarm is on whereas the up-time counter returns the system up-time (in seconds). These counters are resetted using **clear counters** command from Telnet/ASCII terminal or from IDU, - selecting "Reset Counters" in the setup mode.

The management module has a watchdog timer (WDT) built in which manages the automatic restart of the management system if it freezes. Besides the **restartCPU** command the management system can be resetted using **restartWDT** command which breaks off check words to WDT thus causing the management system to restart. The watchdog timer can be turned off using **disableWDT** command (from Telnet/ASCII terminal) and can be turned on only by rebooting the management module CPU.

## Radio parameters

The radio parameter values (transmit frequency and power) are stored internally in Flash memory of the Radio unit, the Radio operates exactly with those values stored in its Flash memory. When the radio parameter is modified during the equipment is in operation, the corresponding radio parameter value in the Radio Flash memory is overwritten with the new one and applied in operation. Also, each time the equipment is booted, the radio parameter values written in the IDU bootstrap are uploaded to the Radio and the previously stored radio parameter values in Flash memory are overwritten with those in the IDU bootstrap. Hence the radio parameter configuration in the IDU bootstrap has a higher priority as they will override the values stored in the Radio on the equipment restart.

Consequently, the radio parameter configuration could be stored in the IDU bootstrap for the purpose to be able to quickly change the Radio unit later. Normally it is not necessary for the IDU bootstrap to contain strings that configure radio parameters.

## IDU name

The IDU name permanently appears in the prompt string of the Telnet or ASCII terminal software, it can also be seen on the IDU LCD by pressing "**clear**" button while in *status display* mode as well as on the Web browser window.

The name of the IDU can only be assigned using Telnet or ASCII terminal, this cannot be done using IDU management interface.

The command line "**Name** <deviceName>" assigns a name to the IDU. The name can be a maximum of 16 symbols long. If using space(s), the argument should be in double quotes.

Example: *Name "SAFterm2 14 7"*

## Security commands

For ASCII, Telnet and Web terminals only one user is supported. The default username and password for Telnet terminal is:

- Username: telnet
- Password: saf

The default username and password for Web terminal is:

- Username: SAF
- Password: test

Take note of upper case and lower case type, it should be taken into account for both username and password!

The passwords may contain spaces, if using space(s) the password should be entered in quote marks.

For ASCII, Telnet and Web terminals the password can be changed simply re-entering the appropriate security command while logged on. To log off press Ctrl+D, the logging off is possible only if the password is specified. To disable password enter the password command appropriate for the specific terminal type followed by empty string, e.g., *enable password ""*.

**Important!**

The specification of password (or username and password) should always be followed by saving the configuration script (using "write" or "cfg write" commands) otherwise the password request will be ignored after the restart of CPU.

The panel access code for the access from IDU panel can be specified from the Telnet/ASCII terminal only. When the access code is specified the adjustment and configuration of any IDU/ODU parameters and loopbacks from IDU LCD is not available unless the correct access code is set up at the IDU (refer to section "*Setup Mode of the LCD*"). The specification of access code should also be followed by saving the configuration script otherwise the access code value will be set to zero (none) on the CPU restart. The panel access code can be changed simply entering the new access code (number from 0 – 200) using *panel access* command. In order to disable the panel access code enter 0 (zero) value.

There is no default password set for ASCII terminal (a terminal connected to RS232 management port) nor the access code from IDU panel is specified, - it is set to 0. Currently there are no possibilities to bypass password of any type of terminal, for instance if the user has forgotten it. The boot recovery functionality for such cases will be available in the upcoming software versions.

**Real-time clock**

The real-time clock does not provide any extra functionality at the moment, however in the upcoming management terminal software versions it will be used for the building of event logs.

It is not available on the LCD of the IDU, the date and time can be viewed using **Time** command when using ASCII or Telnet CLI terminal.

Date and time parameters can be set using **Time** <YYYY-MMM-DDD HH:mm:ss> command line.

## 3.3 Ethernet Management Port

The Ethernet management port of the IDU terminal is intended as main source of management connectivity and will provide the broadest range of management functionality:

- Web management via integrated Web server of management board;
- SNMP management via integrated SNMP agent of management board;
- Telnet server and CLI interface.

Ethernet interface could be used:

- To connect IDU to PC/Laptop to manage IDU;
- To LAN to constantly monitor IDU;
- To router or any other TCP/IP packet network termination unit to have IDU as part of network for management information.

### 3.3.1 SNMP Interface

In order to receive SNMP traps from the IDU management controller, the IP address of the management PC with the installed Trap Manager software (based on SNMP platform) should be specified from a Telnet or ASCII console.

The IP address of the SNMP Trap Manager can be specified using the "SNMP trap <IPaddress>" command.

The default value is **255.255.255.255** (no SNMP Trap Manager specified).

The Trap Manager address should be configured for each IDU, from which it is necessary to receive information on parameters, counters and alarms. The information is sent as SNMP Trap packets through the mediation of UDP protocol. If the Trap Manager terminal cannot be accessed, - for example, if there is no device connected to the Ethernet management port or IP settings of the management port are improper, a longer delay (about 10 sec.) may appear on the IDU startup. SNMP management functionality is available from any SNMP browser, by means of compiling SAF MIB to browser's MIB base.

SAF MIB is available from:

- SAF Tehnika Web site: [www.saftehnika.com](http://www.saftehnika.com),
- From SAF Tehnika tech support, email: [techsupport@saftehnika.com](mailto:techsupport@saftehnika.com),
- Contacting SAF Tehnika or distributors.

```
***** SNMP QUERY STARTED *****
1: termProduct.0 (octet string) SAF CFM-34 E3
2: termDescription.0 (octet string) SAF microwave radio
3: termLocation.0 (octet string) T_15
4: termVersion.0 (octet string) V3.62 2003.08.28
5: termOperation.0 (integer) ok(2)
6: termIduTemperature.0 (integer) 29
7: termRfCablePowerStatus.0 (integer) off(0)
8: termUpTime.0 (integer) 109
9: termDownTime.0 (integer) 407
10: inputA.0 (integer) off(0)
11: inputB.0 (integer) off(0)
12: inputC.0 (integer) off(0)
13: inputD.0 (integer) off(0)
14: outputA.0 (integer) off(0)
15: outputB.0 (integer) on(1)
16: outputC.0 (integer) on(1)
17: outputD.0 (integer) on(1)
***** SNMP QUERY FINISHED *****
```

*Sample of SNMP query of the CFM-34-E3 IDU*

The following table describes all variables defined in the MIB.

Variable Name	Variable Type	Value List	Description
termProduct	String		Textual name of terminal type
termDescription	String		Textual description of terminal
termLocation	String		IDU name
termVersion	String		Textual version of management software
termOperation	Integer (32 bit)	none(0) booting(1) ok(2) testing(3) error(4)	Terminal (IDU) operational status: <i>none</i> – not initialized; <i>testing, illegalSpeed, error</i> – reserved
termIduTemperature	Integer (32 bit)		Temperature within IDU (range: -128..127)
termRfCablePowerStatus	Integer (32 bit)	off(0) ok(1) short(2) error(3)	Indicates power consumption of the ODU: <i>ok</i> - acceptable level, <i>short</i> - short circuit in cable, <i>off</i> - too low power consumption, <i>error</i> – internal fault
termUpTime	Integer (32 bit)		System up-time in seconds
termDownTime	Integer (32 bit)		System down-time in seconds
bbVersion	String		Textual version of the Base-band controller software
bbOperation	Integer (32 bit)	none(0) booting(1) ok(2) testing(3) loopback(4) illegalSpeed(5) error(6)	Operational status of the Base-band modem: <i>none</i> – not initialized <i>loopback</i> – Base-band loop is set on <i>testing, illegalSpeed, error</i> – reserved
bbLinkCapacity	Integer (32 bit)		Base-band link capacity in Kbps
bbLinkCapacityDescription	String		Comment on Base-band link
bbLoopback	Integer (32 bit)	off(0) digital(1) analog(2)	Base-band loopback
bbSyncLostAlarm	Integer (32 bit)	none(0) on(1)	Sync Lost Alarm, <i>none</i> – off
mode	Integer (32 bit)	unframed(0) framed(1) full(2)	The operation mode of the IDU
framingErrors	Integer (8 bit)		Integer which shows the count of frames with faulty sync bit pattern since the IDU boot-up, maximum count is 256
inputA	Integer (32 bit)	off(0) on(1)	Input A
inputB	Integer (32 bit)	off(0) on(1)	Input B
inputC	Integer (32 bit)	off(0) on(1)	Input C
inputD	Integer (32 bit)	off(0) on(1)	Input D
outputA	Integer (32 bit)	off(0) on(1)	Power alarm (output)
outputB	Integer (32 bit)	off(0) on(1)	Synch lost alarm (output)
outputC	Integer (32 bit)	off(0) on(1)	Radio alarm (output)
outputD	Integer (32 bit)	off(0) on(1)	TxPLL alarm (output)
rfRxState	Integer (32 bit)	low(0) ok(1) error(2) loopback(3)	Reception status: <i>low</i> – Rx signal level <i>ok</i> - normal <i>error</i> - internal fault in the Radio <i>loopback</i> – RF loop is set on

rfOperation	Integer (32 bit)	none(0) booting(1) ok(2) testing(3) error(4) noDataFromODU (5)	Operational status of the Radio: <i>none</i> – not initialized <i>testing, error</i> – reserved <i>noDataFromODU</i> – no data is being received from ODU
rfAlarm	Integer (32 bit)	off(0) on(1)	Radio alarm status
rfVersion	String		Version of the Radio
rfSide	Integer (32 bit)	low(0) high(1)	Subband in which the radio operates
rfChannel	Integer (32 bit)		Current frequency channel
rfTxFrequency	String		Current Tx frequency
rfRxFrequency	String		Current Rx frequency
rfTxPower	Integer (32 bit)		Current transmit power
rfRxLevel	Integer (32 bit)		Received signal level [dBm]
rfCableAttenuation	Integer (32 bit)		Signal attenuation in ODU-IDU cable (0...-20 db - proper operation)
rfTxOut	Integer (32 bit)	error(0) ok(1) off(2)	Operation status of the ODU transmitter: <i>ok</i> – proper operation <i>error</i> – internal fault (no data from ODU) <i>off</i> – Tx power = off
rfTxPLL	Integer (32 bit)	error(0) ok(1)	Operation status of ODU Tx syntheser loop (PLL lock): <i>ok</i> – normal operation <i>error</i> - internal fault in ODU transmitter
rfRxPLL	Integer (32 bit)	error(0) ok(1)	Operation status of ODU Rx syntheser loop (PLL lock): <i>ok</i> – normal operation <i>error</i> - internal fault in ODU transmitter
rfOduTemperature	Integer (32 bit)		Internal temperature of ODU (°C)
rfOduHumidity	Integer (32 bit)	low(0) high(1)	Humidity level inside ODU: <i>low</i> - acceptable moisture level
rfLoopback	Integer (32 bit)	off(0) on(1)	RF loopback
rfRxAlarmLevel	Integer (32 bit)		Rx level (in dBm) at which the Radio Alarm is switched on
chlos	Integer (32 bit)	off(0) on(1)	LOS alarm status
chais	Integer (32 bit)	off(0) on(1)	AIS status
chloopback	Integer (32 bit)	off(0) analog(1) remote(2)	Loopback status
chinput	Integer (32 bit)	ungrounded(0) grounded(1)	E3 port input status (shield grounded or ungrounded)

### 3.3.2 Web Interface

The implementation of Web interface for the E3 IDU provides monitoring and configuring capabilities similar to ones available from the IDU LCD, front panel LEDs, and from the Telnet/ASCII console, please refer to description of status parameters described in section "Status Display" Mode of the LCD, page 10 and front panel LEDs in Chapter 2.2.2, page 7.

**The Web interface functionality is available via the Ethernet management port only.**

Web interface is accessible by any standards based Web browser.

The screenshot shows a web browser window with the following content:

[HOME](#) [Configuration](#)

## T\_15 SAF CFM-34 E3

Radio interface	
No data from ODU	
RF Cable - OFF	

Alarms	
Signal Lost WAN = ON	
Signal Lost LAN = ON	
Radio alarm = ON	

System information	
V3.62 2003.08.28	
RxAlarmLev = -71	
IDU t= 30C	
UpTime=239	
DownTime=927	
BBLoopback=OFF	
Framing Err=23	
MUX Mode=framed with service line	

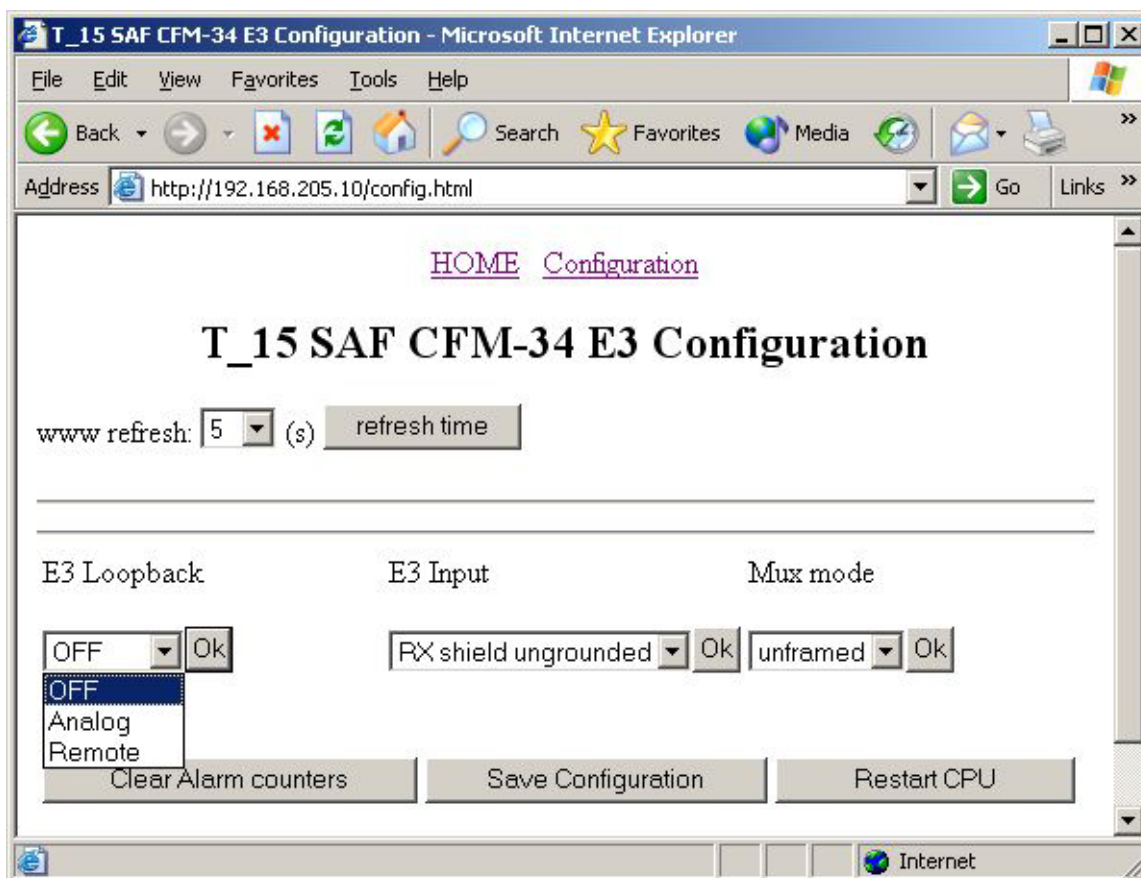
E3	
LOS	ON
Analog loopback	OFF
Remote loopback	OFF
Bipolar violations	OFF
AIS	OFF
Input	grounded
Input: 0000 Output: 1110	

The Main Web management window: it shows the Radio characteristics, main system settings, and alarm status. Entries, which are highlighted in red, indicate that specific parameters do not comply with the norms of normal operation, all other parameters are satisfactory

When clicked on the *configuration* link for the first time, you will be prompted to enter User Name and Password. The default username is **SAF** (in capital letters) and the default password is **test**.

From the configuration window it is possible to:

- restart the management CPU,
- change the Web page refresh time,
- save the configuration,
- set E3 interface loopback,
- set the operation mode of the E3 IDU,
- reset uptime and downtime counters.



*The Configurations window (Radio parameter configuration is disabled)*

The *Main Configuration* window also offers to configure the Radio parameters: the frequency channel and the transmit power. The radio parameter configuration from Web page is factory-set as disabled. It can be enabled with *enable rfweb* command from Telnet or ASCII console.

### 3.4 Alarm Interface Port

The Alarm port is an optional feature.

The Alarm port comprises the set of *outputs* of relay switches intended for the CFM site supervision and the user *inputs* to connect an external device that requires to be supervised. Each output of the relay switch can be used either as NO type (normally open) or NC type (normally closed).

The following alarms are available through the alarm port as parallel relay *outputs*:

- A: Power alarm. If there are no problems with DC power supply to any component of the site, the relay is closed (active relay state or initial state); if power supply failure – relay is opened (passive relay state).
- B: SL – *Synch Lost* alarm, ON - relay is closed (active state), OFF – relay is opened (passive state).
- C: RA – *Radio Alarm*, ON - relay is closed, OFF – relay is opened (normal operation).
- D: TxPLL – Tx Phase-locked Loop failure, ON - relay is closed, OFF – relay is opened (normal operation).

There are four parallel *inputs* of the alarm port available: input A, input B, input C, input D. These inputs are used for connection of an external device which supplies DC voltage on input, - "0" or "1"; the alarm status triggers if input voltage is changed between "0" and "1"; refer to Chapter 6 for electrical specifications.

The alarm port inputs and outputs can be supervised via SNMP manager and/or Web console.

For information on Alarm port pinouts and electrical specifications, please refer to Chapter 6.

### 3.5 Configuring Management Service Channel

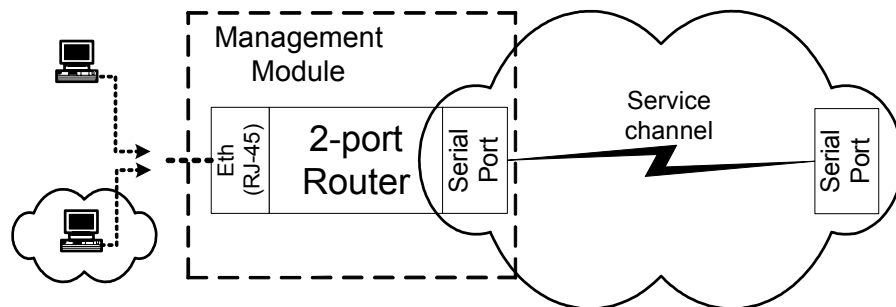
Before using the Management Service Channel, the mandatory precondition is to properly configure the following parameters:

- IP addresses of the **local** and **remote** service channel virtual **serial port** (also referred as service channel IP addresses): the IDU Management Module has a virtual serial port onboard that is used to receive/transmit the management information from/to the other virtual serial port on the far-side via service channel, both of these ports have their IP address.
- IP address and net-mask of the Management Module
- IP address of the gateway or host that is locally connected to the IDU.

The console is connected to the IDU via Ethernet console port located on the Management Module. The console should be configured so as to have routing information to the virtual serial port (service channel port) of the local IDU, - it should either run the RIP thereby automatically obtaining the routing information, or a static route should be added.

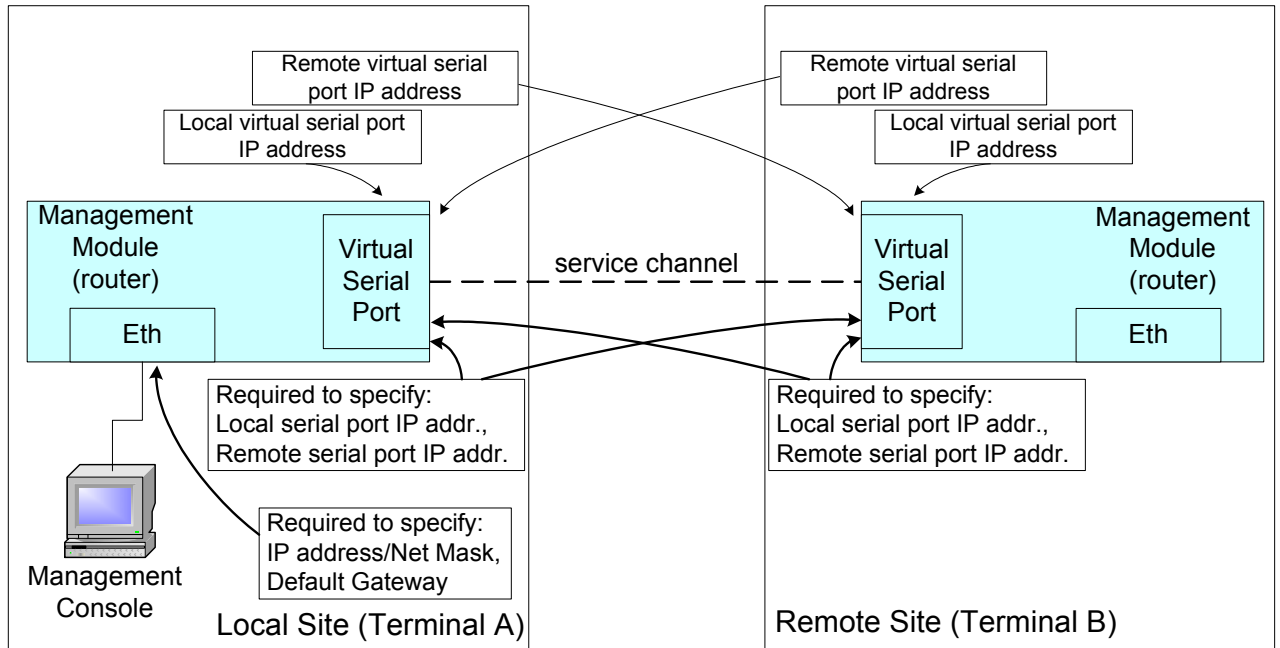
The routing requires determining IP addresses of service channels (virtual serial port IP addresses). Since the Management Module operates as a router between two subnets running the RIP 2, normally it is not necessary to configure the routing by adding static routes.

Virtual serial port IP addresses can be picked from the "private internet" addresses, e.g., 10.X.X.X or 192.168.X.X. Both of these addresses should be different from those used for addressing the IDU, the principle is shown in the picture below, here each cloud depicts a subnet.



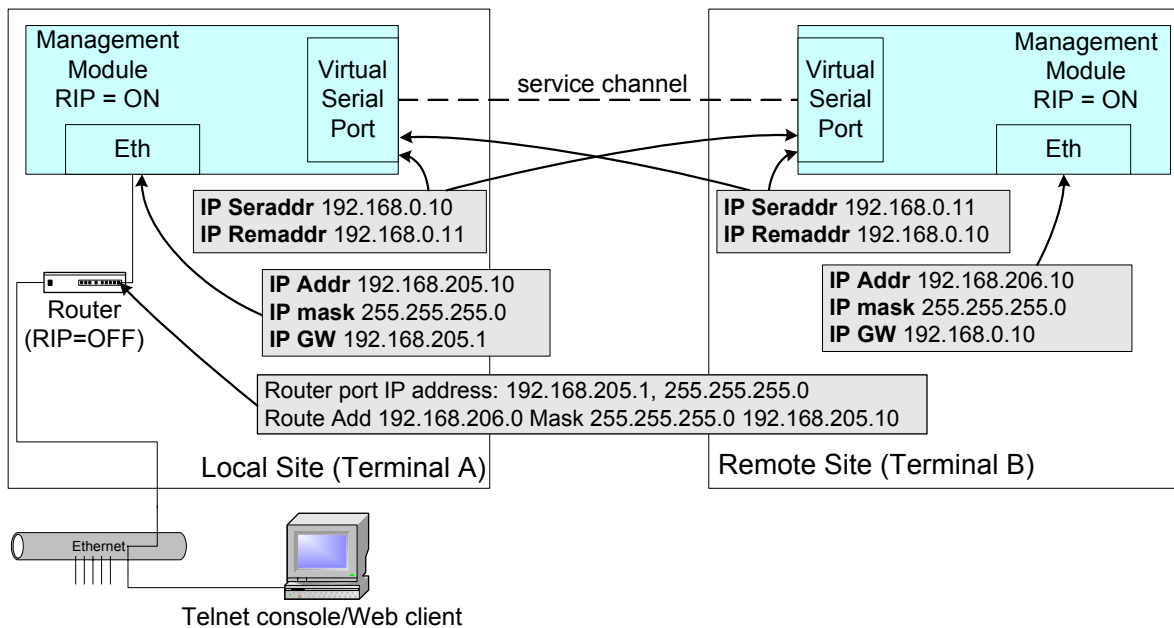
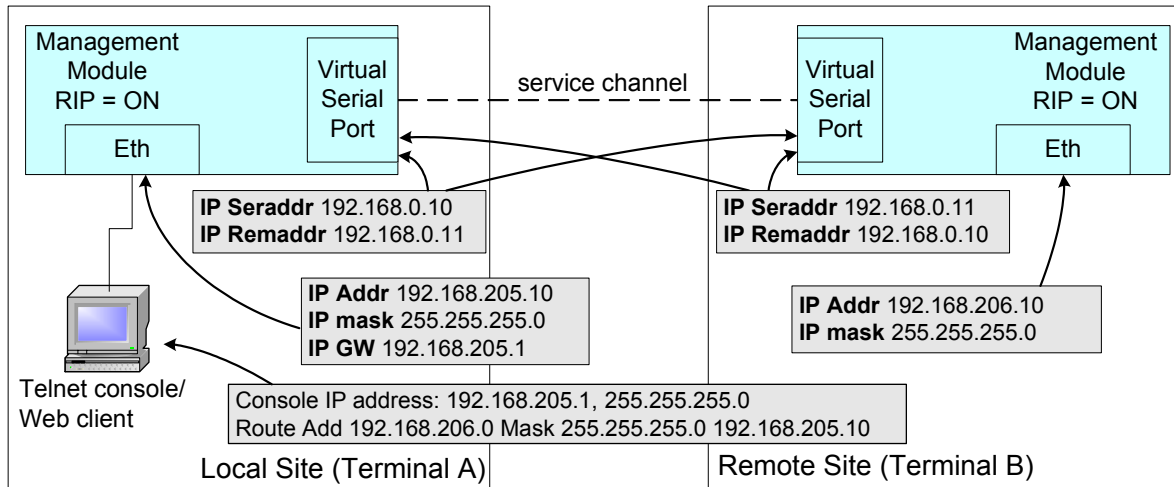
The configuration of local and remote virtual service channel IP addresses should conform the following principle:

	Terminal A	Terminal B
Local virtual serial port IP address	IP 1	IP 2
Remote virtual serial port IP address	IP 2	IP 1

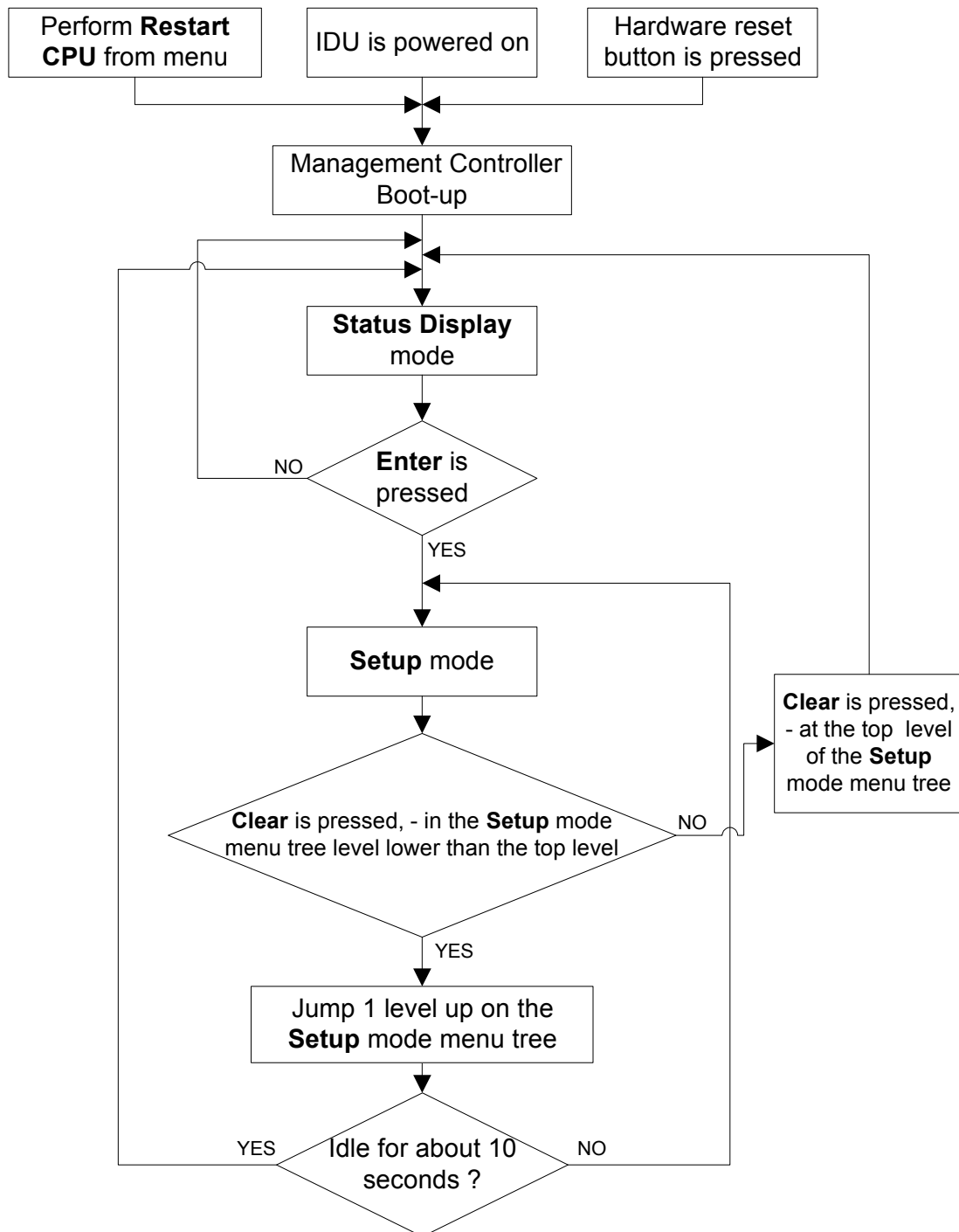


See examples on the next page.

## Examples of service channel configuration



### 3.6 Algorithm of LCD Operation



Flow Chart 1. Using LCD

### 3.7 Replacing the Indoor Unit

Before replacing the IDU, verify the configuration of Radio if possible, - inspect the channel and transmit power settings. Then configure the new IDU in one of the following ways:

- delete the bootstrap via Telnet or ASCII console using *cfg clear* command, or
- configure Radio channel and transmit frequency as needed (from LCD or via management console);

In order to replace the faulty IDU while in operation, take the following steps:

- Disconnect the faulty IDU from the Radio:
  - disconnect the N-type female connector;
  - unplugging of power is optional;
- Connect the new IDU:
  - if the new IDU is previously configured (the transmit power and channel settings are made and the configuration is saved), the Radio will apply these settings after the management controller will be restarted,
  - if configuration script (bootstrap) is empty or does not contain entries on channel and transmit power, the Radio will keep the configuration that was last received from IDU;
- Restart the management controller, for instance, using **RestartCPU** option on the LCD.

### 3.8 Updating Management Software

Updates to management software for management controller board will be available as uploadable files from SAF Tehnika company, sales partners or Web site.

Upload functionality is provided through management controller software monitor function and is available via RS-232 serial port.

The upload can be performed using

- PC/Laptop connected to IDU serial port, using 'SAF Firmware Uploader' program, found on the documentation CD, the instructions how to use this software can be found in its installation directory.
- PC/Laptop connected to serial port of IDU, using any terminal emulation program with text file transferring functionality; the instructions how to update software using this method are given in "Management Software Update Guide".

### 3.9 Default Settings

Parameter/description	Parameter name or command line		Default value/setting
	Telnet / ASCII	LCD	
Operation mode	<b>Mode</b>	<b>Operation mode</b>	full
E3 input shield, - grounded or ungrounded	<b>E3 input</b>	<b>E3 input</b>	grounded
Tx/Rx channel	<b>Chan</b>	<b>Chan</b>	In the middle of the band covered by Radio
Transmitter power	<b>Txpower</b>	<b>Tx Power</b>	Off
Rx signal level by which the Radio Alarm is turned on	<b>RxAlarmLevel</b>	<b>RxAlarmLev</b>	-71 dBm
Management controller IP address	IP <b>addr</b>	<b>IP</b>	192.168.205.10 or 192.168.206.10
Management controller IP address netmask	IP <b>mask</b>	<b>Netmask</b>	255.255.255.0
IP address of the gateway to the service channel	IP <b>gw</b>	<b>Gateway</b>	255.255.255.255
IP address of the local virtual serial port of service channel	IP <b>seraddr</b>	<b>Local IP</b>	192.168.0.10
IP address of the remote virtual serial port of service channel	IP <b>remaddr</b>	<b>Remote IP</b>	192.168.0.11
IDU name	<b>Name</b>	-	SAF
SNMP community name of the agent to read	SNMP community read	-	saf-public
SNMP community name of the agent to write	SNMP community write	-	saf-private
IP address of the SNMP trap manager	SNMP trap	-	255.255.255.255 - trap manager not specified
Web page refresh time	Webrefresh	-	5 seconds
Username and password for ASCII console	Enable password	-	(disabled)
Access number for LCD/Keypad	<b>Panel access</b>	-	0 (disabled)
Username and password for Web terminal	<b>WWWuser</b>	-	Username: SAF Password: test
Username and password for Telnet terminal	<b>Telnetuser</b>	-	Username: telnet Password: saf
Ability to configure Radio parameters from the Web terminal	Enable <b>rfweb</b>	-	disabled

## 4 Configuring Radio Parameters

### 4.1 Default Radio Settings

The Radio units are shipped with disabled Transmitter (TxPower OFF) and channel is set to one in the middle of respective A or B side of the Low or High subband (Radio types: LA, HA, LB, HB), or in the middle of the whole Low or High subband (Radio types: L and H).

### 4.2 Configuring Tx Frequency

The Tx frequency of the CFM LM and the CFM L4 type ODUs can be adjusted in the following ways:

- 1) It can be set through "Set Channel" item of IDU LCD menu system.

If this item is chosen, display indicates:

Channel = xxx Tx = xxxxx.x MHz
-----------------------------------

Where "Channel" corresponds to Tx channel number and "Tx frequency" indicates appropriate frequency in MHz.

Operator sets desired channel number scrolling through values with "Up" or "Down" buttons and confirming the choice with "Enter" button.

- 2) The Tx frequency can be set using "**Chan**" command from Telnet or ASCII terminal, example: *Chan 22*  
22 – channel number.

Since the telemetry data is transmitted between the ODU and the IDU, the concordance of Tx frequency to Low or High band side is detected automatically, and when the Tx channel is configured from the IDU LCD, the LCD displays frequencies within the subband (Low or High) that is covered by the Radio. However, if the ODU covers only a half of the subband (e.g., LA, HA, LB or HB, - depends on the duplexer filter within the ODU), the user should only choose from those Tx frequencies (channels) that are covered by the half of the subband specific to the Radio. If a fault occurs in the ODU that prevents the transmission of telemetry data, the IDU LCD shows "**No data from ODU**".

The Rx frequency is set automatically by Tx frequency.

### 4.3 Configuring Tx Power Setting

The Tx Power level of the CFM series ODU can be adjusted in the following ways:

- 1) It can be set through **Set TxPower** item of IDU LCD menu system.
- 2) The Tx Power can be adjusted using **Txpower** command from Telnet or ASCII terminal, example: *Txpower +10*

The Tx Power can be adjusted from -10 dBm to +20 dBm in steps of 1 dBm as well as turned off (Txpower off).

The default setting is "OFF", allowing safe deployment of the equipment without risk of frequency conflicts with other installed radio equipment.

### 4.4 RSSI Port

RSSI (Received Signal Strength Indicator) port is used to adjust the alignment of antenna for best performance (for both rough and fine adjustment); this can be done using digital multimeter which is connected to the RSSI port. The output of the RSSI port is DC voltage and varies depending on received signal level.

## 5 Performing Loop-back Tests

### 5.1.1 Basaband and Radio Loopbacks

Base-band and Radio (RF) loopbacks can be set on a fixed time interval only; if using LCD/Keypad, the base-band and RF loop test is set for 1 minute. If setting base-band or RF loop from Telnet or ASCII console, the duration of the loopback mode can be specified from 1 to 10 minutes.

#### Radio loopback

The radio loop is set in the ODU. Radio loopback mode is a special ODU operation mode, where the Rx frequency during the loopback mode is set equal to the Tx frequency. During radio loopback mode, the signal is transmitted and looped back through the duplexer filter to the receiver block. The radio loopback is not dual.

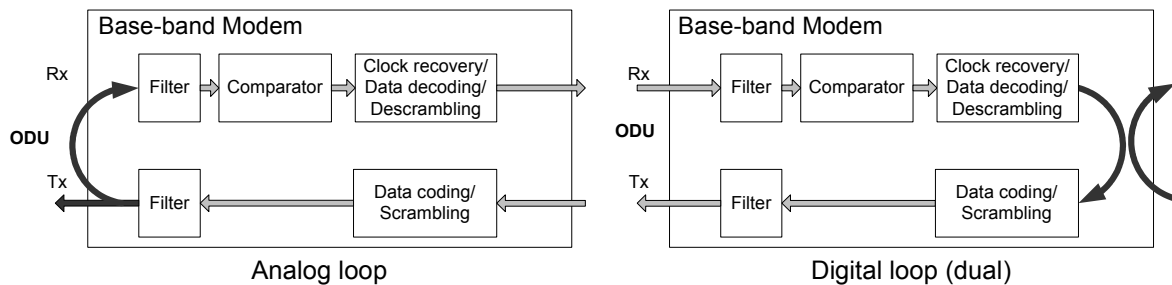
#### Important notes:

1. Because of the frequency characteristic of the duplexer filter, in order to set the radio loop, the ODUs operating in the Low band side must be switched to the highest available frequency channel, but the ODUs operating in the High band side must be switched to the lowest available frequency channel;
2. Before setting the radio loop, the transmitter power should be switched to maximum level;
3. In CFM-18-LM and CFM-18-L4 ODUs the radio loopback mode is not available.

#### Baseband loopbacks

The baseband loop is set in the baseband modem in the IDU. There are two types of **baseband loopbacks** (both can not be activated simultaneously):

- Digital baseband loopback: the signal from the ODU and from the multiplexer in the baseband modem is looped back to the receiving device; the digital baseband loopback is dual (see figure below);
- Analog baseband loopback: the modulated signal on the baseband modem output is looped back to the receiving device and also passed further to the ODU.



## 5.1.2 E3 Interface loopbacks

The E3 interface supports analog and remote loopback modes. Only one type of loopback can be set at a time.

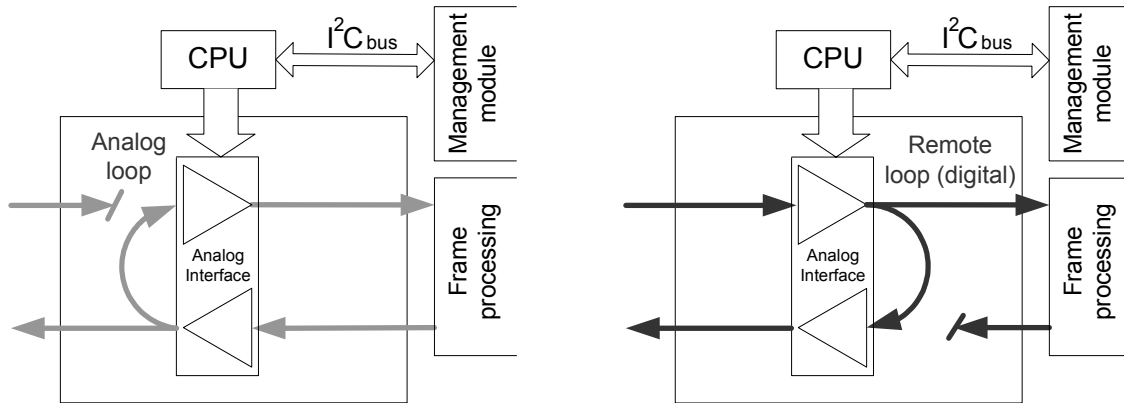


Figure 6. E3 interface loopbacks (analog and remote)

## 5.1.3 Setting Loopback from IDU LCD/Keypad

From the IDU LCD the baseband loop and the RF loop tests are set on a fixed 1 min. time interval as default value, the duration of E3 interface loopbacks are not limited.

- **Baseband loopback:**  
From status display mode proceed as follows: Press "ENTER" to enter setup mode → select "Loopbacks" → select "BBloopback ON" or "BBloop analog" → select "Yes".
- **RF loopback:**  
From status display mode proceed as follows: Press "ENTER" to enter setup mode → select "Loopbacks" → select "RFloopback ON" → select "Yes".
- **E3 interface loopback:**  
From *status display mode* proceed as follows: Press "ENTER" to enter setup mode → select "E3 channel" → select "E3 Loop analog" for analog loopback or "E3 Loop remote" for remote (digital) loopback → confirm.

Only one loopback mode can be active at a time.

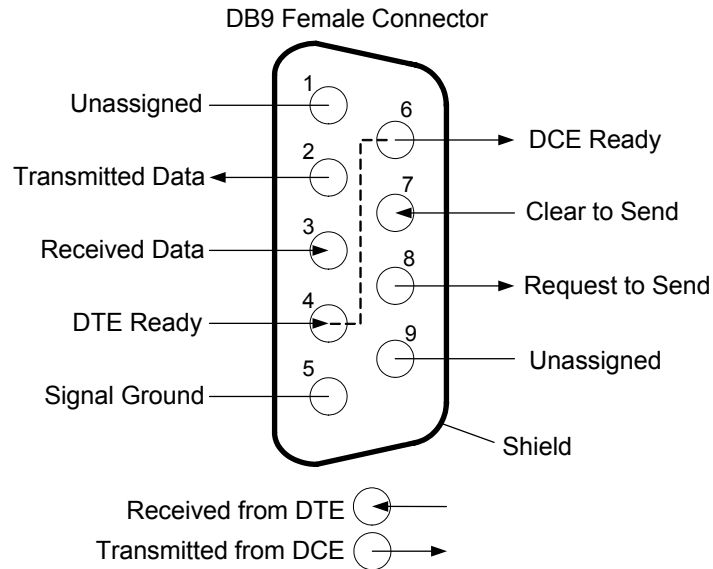
## 5.1.4 Setting Loopback from Telnet/ASCII Terminals

- **E3 interface loopback: E3 Loop** {Analog | Remote | Off} The duration is unlimited.  
Example: *e3 loop remote*
- **Baseband loopback: BBloop** {on | analog | off} [duration]. If using argument "ON" the dual digital baseband loopback is activated, if using argument "analog" the non-dual analog loopback is activated. Duration is set in minutes as values from 1 to 10. If duration is not specified the loopback will be set on 1 minute.
- **RF loopback: RFloop** {on | off} [duration]. Duration (optional) is set in minutes from 1 to 10. If duration is not specified the loopback will be set on 1 minute.

## 6 Pinouts

- Standard Ethernet patch cables should be used with management Ethernet port of the IDU;
- Any "straight through" or modem serial cable could be used with RS-232 Telnet/ASCII management port and RS-232 auxiliary port.
- The cable for alarm interface port should be produced by own in conformity with the specifications given in page 40.

### RS-232 management interface pinouts



## Alarm interface port specification

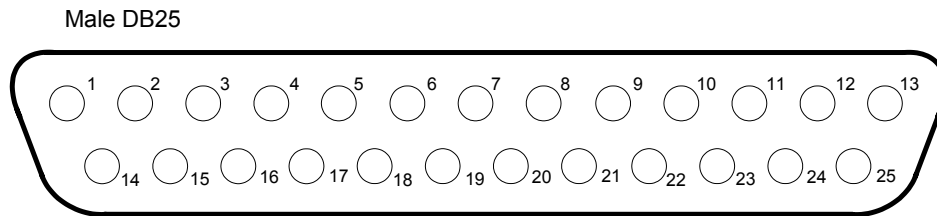


Figure 7. DB25 Male connector pin layout

The pin assignments for relay outputs are the following:

	Output A		Output B		Output C		Output D	
Pair of pins	1-2	2-14	3-4	4-16	5-6	6-18	7-8	8-20
Type: NC* or NO**	NO	NC	NO	NC	NO	NC	NO	NC

NC\* - Normally Closed

NO\*\* - Normally Open

Input pins:

	Input A	Input B	Input C	Input D
Pin	10	11	12	13
GND pins (closest)	22	23	24	25

### Electrical specifications of the outputs of the alarm interface port:

Rated load: 0.5 A at 125 VAC; 2 A at 30 VDC

Max. switching current: 2 A

Max. switching voltage: 250 VAC, 220 VDC

Max. switching capacity: 62.5 VA, 60 W

### Electrical specifications of the inputs of the alarm interface port:

Impedance: 4,7 k $\Omega$ ,

U<sub>0"</sub> = 1...2 V DC,

U<sub>1"</sub> = 2,4...48 V DC.

## 7 Mechanical Data

Weight [kg]	Dimensions HxWxD [mm]
1.7	44x482x284

## **8 SAF Tehnika A/S Contacts**

Most up to date contacts of SAF Tehnika A/S could be found at Web site [www.saftehnika.com](http://www.saftehnika.com).

SAF Tehnika A/S technical support could be reached at:

- Email:                [techsupport@saftehnika.com](mailto:techsupport@saftehnika.com)
- Telephone:        +371 7046840
- Fax:                 +371 7020009

## 9 References

All the documents comprised in this chapter can be ordered from SAF Tehnika or its sales representatives.

### 9.1 Technical Descriptions

There are two technical descriptions available:

- *SAF CFM LM Series Microwave Radio System Product Family: Technical Description*; This document is a generic technical description of the CFM-LM ODU and IDUs that are compatible with it, it comprises the installation and commissioning issues and respective accessories, functional descriptions, technical data, a.o.
- *SAF CFM L4 Series Microwave Radio System Product Family: Technical Description*; This document is a generic technical description of the CFM-L4 radio and IDUs that are compatible with it, it comprises the installation and commissioning issues and respective accessories, functional descriptions, technical data, a.o.

### 9.2 Configuration Guides

Configuration guides provide the necessary information regarding the configuration of SAF Tehnika's CFM products, these documents describe the management system, this is also partly covered in the CFM-LM/L4 Product Family Technical Description.

The following configuration guides are available:

- *CFM Series E1 Indoor Units: Management System Technical Description and Configuration Guide*
- *CFM-34-REBM Modular Fast Ethernet Bridge: Indoor Unit Management System Technical Description and Configuration Guide*
- *CFM-4-REB and CFM-8-REB Ethernet Bridge: Indoor Unit Management System Technical Description and Configuration Guide*
- *CFM Modular Multiplexer: Indoor Unit Management System Technical Description and Configuration Guide*
- *CFM-34-SWB E1 1+1 Indoor Unit: Installation and Configuration Manual*

### 9.3 Channel Plans

This document contains all available frequency channel plans for bands from 7 GHz to 38 GHz.

### 9.4 Management Software Update Guide

This guide provides the user of the CFM series equipment with the information required to update the management software.

- *SAF CFM Series Microwave Radio System Indoor Unit Management Software Update Guide*