

The logo for SAF, consisting of the letters 'S', 'A', and 'F' in a bold, white, sans-serif font. Each letter has three vertical bars of varying heights on its top edge, resembling a stylized signal or barcode. The logo is set against a red rectangular background.

SAF

A close-up photograph of a human hand, palm up, holding a small, translucent blue globe. The globe shows the outlines of continents. The background is a vibrant blue with dynamic, wavy lines in shades of white, yellow, and green, suggesting a digital or network environment.

Connecting ideas

High Capacity Radio System

SAF Tehnika Profile

SAF Tehnika AS is a designer, producer and distributor of digital microwave data transmission equipment. SAF Tehnika products provide wireless backhaul solutions for digital voice and data transmission to mobile and fixed network operators, data service providers, governments and private companies. The

CFQ Product Family

SAF CFQ is a safe and affordable wireless communications point-to-point system. CFQ digital radios provide high capacity (up to 622 Mbps) transmission, flexibility, features and convenience for wireless communications networks. CFQ series digital point-to-point radios represent a new microwave radio product line that is designed to address universal applications for both PDH and SDH platforms. This advanced technology platform is designed to provide flexibility to customers currently and in the future.

CFQ family is composed of an Indoor Unit (SD-IDU) and Outdoor Unit (ODU). Indoor Unit is designed to be frequency independent but ODU – capacity independent.

CFQ-SD-IDU is based on a common platform to support wide range of network interfaces and configurations, including 16xE1, 21E1, 32xE1, 42E1, 63E1, 1 or 2x100Base TX Ethernet, Gigabit Ethernet and 1xSTM-1.

Any CFQ IDU is a modular multiplexer component for SAF CFQ microwave radiolink system featuring modular design. For CFQ-SD-IDU: modem module, power supply module, management module and traffic modules. CFQ-SD-IDU allows selection for multiple capacity options, modulation types, radio frequency

Company offers 3 product lines: CFM family – low to medium capacity radio equipment (PDH), CFQ family – high capacity radio equipment (SDH) and the new CFIP family – 100Mbps capacity radio equipment.

channels and transmit output power levels to accommodate and adhere to world-wide regulatory and spectral efficiency requirements.

CFQ-SD-IDU supports 1+0, 1+1 protection and ring architectures in a single 1U chassis. Any CFQ IDU supports 1+0 and protected 1+1 in Hot Stand-by (hitless, errorless) or Space/Frequency diversity.

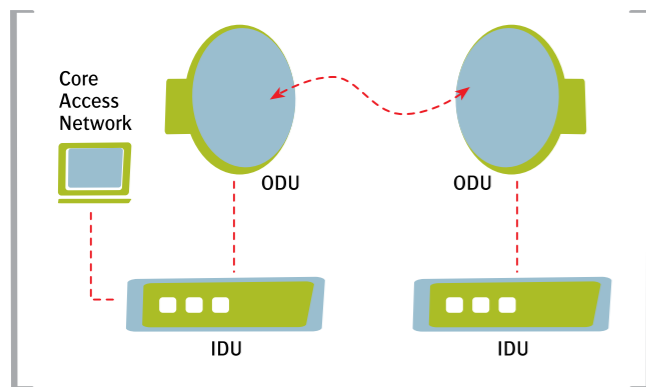
The companion ODU, mounted outdoors, can support frequency bands: 6, 7, 8, 11, 13, 15, 18, 23 and 38 GHz. The radio family is spectrum and data rate scalable, enabling service providers or organizations to employ appropriate system gain with spectral efficiency and channel availability for optimal network connectivity. The radio enables network operators (mobile and fixed), government and access service providers to offer a portfolio of secure, scalable wireless applications for data, video and voice.

The equipment includes integrated Operations, Administration, Maintenance and Provisioning (OAM&P) functionality and design features enabling simple commissioning when the radio network is initially set up in the field at the customer's premises.

Our Advanced Approach Grants our Products:

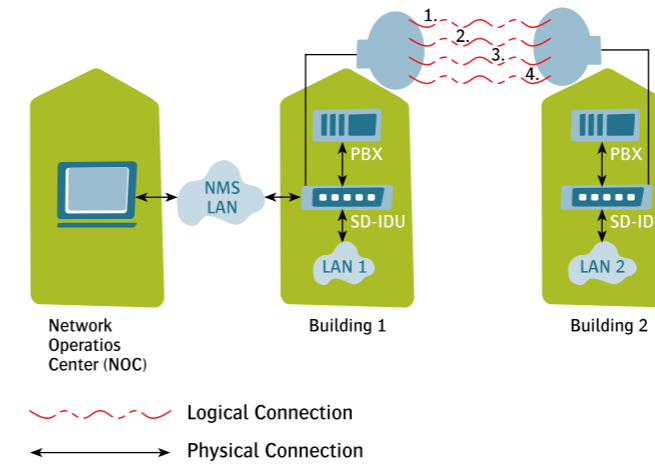
- Excellent reliability
- Perfect modularity
- Wide range of data and voice interfaces
- Outstanding technical parameters for radio and data traffic interfaces
- Attractive pricing
- User-friendly management system
- Compact and handy design
- Low power consumption

CFQ Architecture



Application Examples Using CFQ Products

nxE1 + Ethernet with SD-IDU (e.g., 63E1 + 30Mbps Ethernet)



■ Data traffic over a radio link:

- Payload: E1 (2 - 63), STM-1, Ethernet (1-100Mbps);
- Auxiliary: Voice Orderwire, Data Orderwire;
- NMS – Network Management System Traffic;
- Radio overhead (e.g., Adaptive Power Control).

■ Point-to-Point:

- Useful for Ethernet bridge, E1 extension, STM-1 extension.

Nr.	Data Interfaces	Capacity
1.	nxE1 between PBX boxes	Up to 63E1
2.	Auxiliary: Voice & Data Orderwire	63Kbps + Voice
3.	NMS: Building 1 -> Building 2	0.5 – 10 Mbps
4.	Ethernet: LAN 1 -> LAN 2	Up to 155 Mbps
Total capacity		Up to 160 Mbps

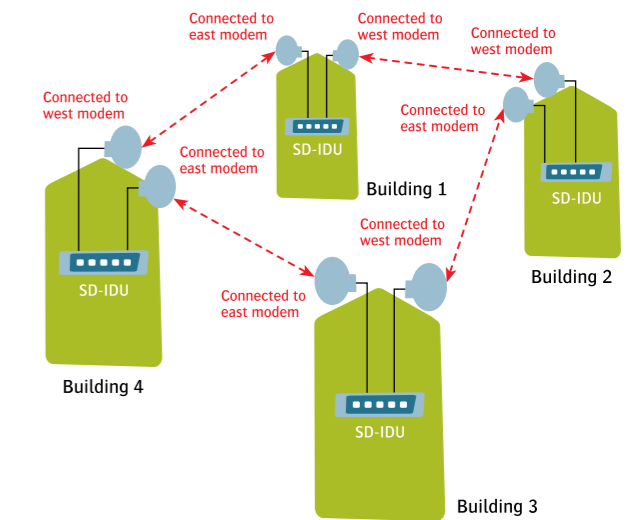
SD-IDU East/West Ring

■ Ring Switching

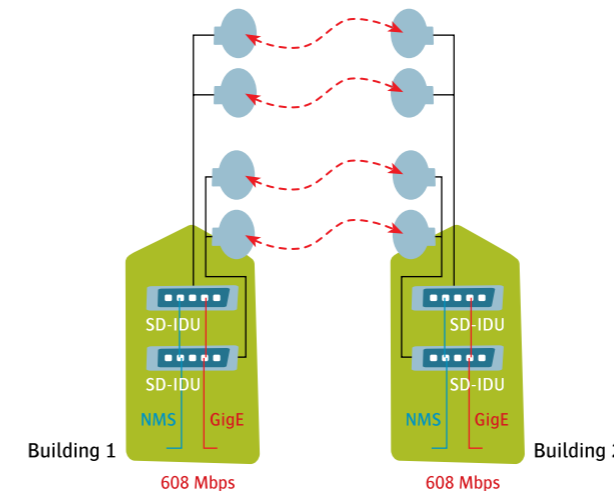
The ring consists of 3 or more SD-IDUs connected with the east modem of one SD-IDU connected to the west modem of the next SD-IDU, forming a continuous chain of SD-IDUs.

At each site CFQ-SD-IDU can be configured to:

- Add to radio link or Drop from the radio link E1s via RJ-45 interface (Standard Base);
- Add/Drop Ethernet traffic up to 155Mbps via RJ-45. Traffic at each site is fixed to all the sites in the ring (Standard Base);
- Mux/Demux up to 63E1s via STM-1 interface (Enhanced Base).



4+0 East/East 608 Mbps Gigabit Ethernet with SD-IDU



- Ethernet capacity up to **608 Mbps** at 28 MHz using 4x28 MHz channels;

- 4+0 unprotected system at the same time works also as 3+1 protected system, thus loss of a link reduces bandwidth only by 25%;

- Both IDU are operated in 2+0 East/East mode. Master IDU has 1 SFP and 3 RJ-45 Ethernet active ports for data traffic while slave IDU is connected to master IDU only.

- Similar configurations are available: 2+0 (1+1) East/East (**304 Mbps**) and 3+0 (2+1) East/East (**456 Mbps**).

CFQ Technical Specification

CFQ ODU / CFQ Wideband ODU

CFQ ODU											CFQ Wideband ODU									
Model	CFQ-6	CFQ-7	CFQ-8	CFQ-11	CFQ-13	CFQ-15	CFQ-18	CFQ-23	CFQ-38		CFQ-6-WB	CFQ-7-WB	CFQ-8-WB	CFQ-11-WB	CFQ-13-WB	CFQ-15-WB	CFQ-18-WB	CFQ-23-WB	CFQ-38-WB	
Modulation	QPSK, 16/32/64/128-QAM										QPSK, 16/32/64/128-QAM									
Capacity	Up to 63E1; up to 155Mbps; STM-1										Up to 63E1; up to 310Mbps; Ethernet; STM-1									
Channel bandwidth (MHz)	7, 7.5, 13.75, 14, 27.5, 28, 30 MHz (according to specific channel plan)										13.75, 14, 27.5, 28, 30, 40, 56 MHz (according to specific channel plan)									
Intermediate Frequency (MHz)	Transmit/Receive: 350/140										Transmit/Receive: 350/140									
Frequency stability (ppm)	+/-7	+/-10	+/-7	+/-7	+/-10	+/-10	+/-10	+/-10	+/-10	+/-10	+/-7	+/-7	+/-7	+/-7	+/-7	+/-7	+/-7	+/-7	+/-7	+/-7
Background BER	<10 ⁻¹²										<10 ⁻¹²									
Performance	Performance parameters correspond to recommendations ETSI EN 301 129 V1.1.2 (1999-05), EN 301 126 V1.1.2, EN 301 390 V1.2.1, EN 302 217-2-1 V1.1.3, EN 302 217-2-2 V1.1.3										Performance parameters correspond to recommendations ETSI EN 301 129 V1.1.2 (1999-05), EN 301 126 V1.1.2, EN 301 390 V1.2.1, EN 302 217-2-1 V1.1.3, EN 302 217-2-2 V1.1.3									
Max. Transmitter power (dBm) SP / HP*	QPSK	27/32	30	27/32	27/32	28	27	22	22	20	27/33	27	27/33	27	27	26	23	23	21	21
	QAM16	24/29	27	24/29	24/29	25	24	19	19	17	24/30	24	24/30	24	24	23	21	21	18	18
	QAM32	24/29	24	24/29	24/29	23	21	18	17	15	24/30	24	24/30	24	24	23	21	21	18	18
	QAM128	22/27	24	22/27	21/26	22	21	18	16	14	22/27	22	22/27	21	21	20	19	19	16	16
Output power increments (dB)	0,5	0,1	0,5	0,5	0,1	0,1	0,1	0,1	0,1	0,1	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Output power dynamic range (dBm) SP / HP**	-5 to +27 / -5 to +32	+9 to +30	-5 to +22 / -5 to +27	0 to +28 / +5 to +33	+5 to +28	+5 to +27	+3 to +22	0 to +22	-1 to +20		0 to +27 / +5 to +33	0 to +27	0 to +27 / +5 to +33	0 to +27	0 to +27	0 to +26	0 to +23	0 to +23	0 to +21	0 to +21
Received thresholds (dBm/System gains dB (guaranteed***) BER10-6 SP / HP*)	QPSK	-88/114 / -87/119	-88/116	-86/113 / -86/118	-87/114 / -86/118	-88/116	-87/114	-85/108	-85/107	-84/103	-84	-84	-84	-84	-83	-83	-82	-82	-82	-82
	QAM16	-83/106 / -82/111	-79/106	-81/105 / -81/110	-82/106 / -81/110	-79/104	-78/102	-78/97	-77/96	-75/92	-79	-79	-79	-79	-78	-78	-77	-77	-77	-77
	QAM32	-79/102 / -78/107	-76/100	-77/101 / -77/106	-78/102 / -77/106	-76/99	-75/96	-75/94	-74/91	-72/87	-75	-75	-75	-75	-74	-74	-73	-73	-73	-73
	QAM128	-71/91 / -69/96	-70/94	-68/90 / -68/95	-70/91 / -68/94	-70/92	-69/90	-69/87	-66/84	-66/80	-67	-67	-67	-67	-66	-66	-65	-65	-65	-65
Flange type	UDR70	UBR84	UBR84	UBR100	UBR140	UBR140	UBR220	UBR220	UBR320		UDR70	UDR70	UBR84	UBR100	UBR140	UBR140	UBR220	UBR220	UBR320	
Max. Input power at antenna port	10dBm										10dBm									
Polarization	Vertical or horizontal, field selectable										Vertical or horizontal, field selectable									
Mounting options to antenna	Direct or via flexible waveguide										Direct or via flexible waveguide									

* SP / HP - standard power/high power

** Typical received thresholds are up to 3 dBm better than guaranteed thresholds (depending on frequency, channel bandwidth and modulation)

*** Please contact SAF Tehnika customer service

CFQ-SD-IDU Data Modules

Base Modules	
Standard Base (Link Capacity: 50Mbps, 100Mbps, 155Mbps)	A standard module provides connectivity up to 155Mbps, e.g., 100Mbps Ethernet and 16E1. By adding an expansion module – up to 32 x E1. Interfaces: - 14 x E1, high-density Molex connector - 2 x E1, RJ-48C connector - Voice, Data ORW RJ-48C connectors - 100BaseTX, 25-100 Mbps, two RJ-45 ports
Enhanced Base	An enhanced standard module provides the same as standard module and by adding STM-1 it provides ability to demultiplex up to 63 x E1 PDH signal from SDH signal. Interfaces: - 14 x E1, high-density Molex connector - 2 x E1, RJ-48C connector - Voice, Data ORW RJ-48C connectors - 100BaseTX, 25-100 Mbps, two RJ-45 ports
42E1 Base	Provides 63E1 capacity with 21E1 expansion module - 42 x E1, 3x high-density Molex connector - Voice, Data ORW RJ-48C connectors - 100BaseTX, 25-100 Mbps, two RJ-45 ports
GigE Base - supported packet length - up to 4000 bytes	Provides connectivity for Gigabit Ethernet. Interfaces: - 4x10/100/1000Base-T ports with RJ-45 connector - Ethernet SFP port - 2 x E1, RJ-48C connector - Voice, Data ORW RJ-48C connectors
Enhanced GigE Base - supported packet length - up to 9728 bytes	
Optional Modules	
16E1 Expansion module	- 14 x E1, high-density Molex connector - 2 x E1, RJ-48C connector
21E1 Expansion module	- 21 x E1, 2x high-density Molex connector
STM-1 Optical mini module	STM-1, Single mode 1310 nm, SC Duplex Transceiver. Unconditionally eyesafe laser IEC 825/CDRH Class 1 Compliant
STM-1 Electrical mini module	STM-1, 2xBNC, ITU-T Rec. G.703, 75Ohm

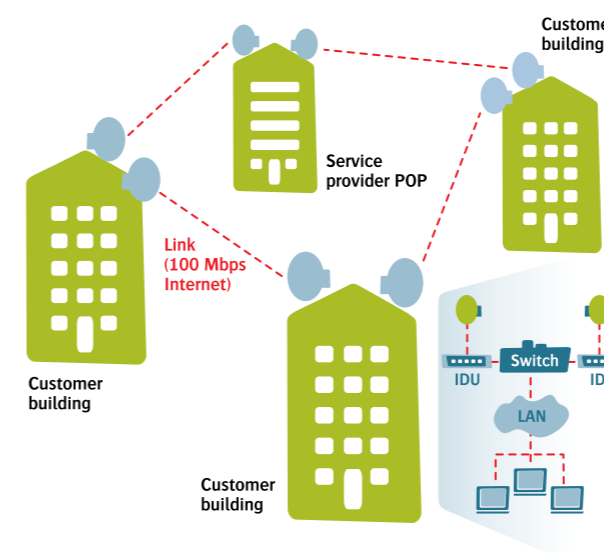
CFQ-SD-IDU



CFQ-SD-IDU Management

Management Features	
Management options	Web interface, Command line interface (Serial/Telnet/SSH), SNMP Agent
IP configuration	Manual or DHCP client for automated NMS network configuration
SNMP configuration	v1 / v2 / v3; SNMP traps
Serial port configuration	RS-232
Security configuration	Web GUI SSL and SSH Terminal
Feature authorization	4 user access levels
Link configuration features	Modulation, Bandwidth, E1 channels, Ethernet, STM-1
Firmware Upgrade	Supported, e.g. via FTP
Status and Monitoring	
Automated alarm reporting	WEB Active Alarm Table / E-mail notification / Remote logging to Syslog server
Event/Alarm Log	Connectivity Alarms, RSL, Errorred – Seconds, Signal/Noise ratio

CFQ Network Management System (NMS)



All of the CFQ Digital Radio parameters are accessible in three ways:

1. Using a standard web-browser via HTTP top access the built in webserver;
2. Via SNMP using the fully featured MIB, allowing for automation of data collection and network management;
3. Via a command line client accessible from a terminal client connected to the serial port, or telnet over the NMS Ethernet.

Control of the CFQ digital radio family is supported as follows:

- PC-based Graphical User Interface;
- Other Network Management options.



We are offering:

- High quality products
- Flexible delivery terms
- Professional technical and customer service support
- Fast warranty service
- Developed partners network



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