



Customized Microwave Solutions™

Point-to-Point
Microwave Radio
Equipment for
Data and Voice
Communication

Produced in Europe

SAF Tehnika

SAF Tehnika is among the world's top microwave carrier-class point-to-point radio manufacturers, publicly traded in NASDAQ, ISO certified, with R&D and complete production in Europe, distributed in 99 countries worldwide, covering spectrum 300 MHz - 38 GHz and licence-free 24 GHz with capacities up to 366 Mbps full-duplex (per radio). Company has 9 years experience in designing and manufacturing durable, high quality all outdoor radios.

The company offers 2 main product lines:

CFIP series

- 1.4 GHz Marathon FIDU (long-haul);
- 366 Mbps Lumina FODU (Optical&Electrical Gigabit Ethernet);
- CFIP-106 FODU (Fast Ethernet);
- 363 Mbps Phoenix Hybrid Split Mount System.

SAF FreeMile

- 100 Mbps full duplex licence-free FODU



CFIP - 106 FODU

CFIP-106 is primarily designed for IP networks and provides Fast Ethernet interface with capacities up to full-duplex 100 Mbps Fast Ethernet. In addition to that, CFIP-106 has a 4 T1 port for legacy equipment connectivity and for use in hybrid TDM/IP networks.



CFIP Lumina FODU

CFIP Lumina systems are intended for Gigabit Ethernet backbone applications delivering up to 366 Mbps per radio. 2+0 aggregation is available for higher bandwidth users. Both single or dual, electrical and fibre optical interface versions are available, as well as hybrid version with 1 optical and 1 electrical port.



CFIP Phoenix Split Mount

CFIP Phoenix split mount system is designed to fit in classical telecom architecture with a radio located outdoors and a sheltered indoor unit. CFIP Phoenix also enables transition from TDM networks to hybrid TDM/IP networks providing up to 20 T1 + GigE. Total maximum capacity is up to 363 Mbps full duplex (per radio).

CFIP Series Technical Specification

Radio & Modem	Full outdoor system with built-in radio, modem and traffic interfaces		Split Mount system
	CFIP - 106 FODU	CFIP Lumina FODU	CFIP Phoenix Split Mount
Frequency Bands	6, 7, 11, 13, 15, 18, 23, 24, 38 GHz		6, 7, 11, 13, 15, 18, 23, 38 GHz
Capacity	up to 106 Mbps	up to 366 Mbps	IDU: up to 363 Mbps ODU Unified Band: up to 363 Mbps
Channel bandwidth:	10/20/30 MHz	20/30/40/50/56 MHz	IDU: 5/10/20/30/40/50/56 MHz ODU Unified Band: 5/10/20/30/40/50/56 MHz
Modulation	QPSK, 16APSK, 32APSK, 64QAM; for 10MHz bw only: 128QAM	QPSK, 16APSK, 32APSK, 64QAM, 128QAM, 256QAM (for all bw)	
Protection Switching	1+0 Ring/Mesh (with STP)	1+0, Ring/Mesh (with RSTP/ MSTP)	1+0, 1+1 (HSB, SD, FD), Ring/Mesh (with RSTP/MSTP)
Aggregation	–	2+0 (Ethernet Aggregation)	Phoenix: 2+0, 3+0, 4+0 (Ethernet Aggregation)
ACM switching	Hitless ACM		
Interfaces			
Ethernet port	1xRJ-45 (electrical)	1 or 2 RJ-45 (electrical) or 1 or 2 ODC (fiber optical) Hybrid: 1 RJ-45 (electrical) & 1 ODC (optical)	4xRJ-45 (electrical)
T1	4 T1 (18-pin connector)	–	20 T1 (RJ-45)
Power	PoE+ (not IEEE standard)	Outdoor power connector, PoE with surge arrestor solution	IDU power connector
RSSI port	BNC		ODU: BNC
Serial Port	Dual-BNC		DE9 (RS-232)
EOW	–		2x 3.5mm headset ports (Mic&Speaker)
Alarm port	–		DB26HD
1+1 Port	–		RJ-45
IDU-ODU connection	–		N-Type
Connection to antenna	Standard flange according to frequency		

Management			
Product name	CFIP - 106 FODU	CFIP Lumina FODU	CFIP Phoenix Split Mount
Management ports	RJ-45 (same as traffic port)	RJ-45 (electrical) or ODC (optical)	RJ-45
Management	In-band	In-band (traffic port) or VLAN port seperated	
SNMP	SNMP traps, MIB, SNMP v1/v2c, RMON		
EMS	Web based HTTP, Telnet, FTP, Terminal		
Performance graphs	Uptime, Rx level, Tx level, System temperature, Radial MSE, LDPC decoder stress, constellation diagram, equalizer graph		
Ethernet performance	Per port Ethernet counters, Enhanced radio Ethernet statistics		
Loopbacks	T1, modem		
Ethernet			
Switch Type	Managed Fast Ethernet Layer 2	Managed Gigabit Ethernet Layer 2	
Max frame size	1916 bytes	9728 bytes	
MAC table	1K entries; automatic learning and aging	4K entries; automatic learning and aging	
Packet buffer	32KB; non-blocking store&forward	128KB; non-blocking store&forward	
Flow Control	802.3x		
QinQ (Double Tagging)	Yes, 802.1ad (Provider Bridging Technique)		
QoS	64 level DiffServ (DSCP) or 8 level 802.1p mapped in 4 prioritization queues with VLAN support		
QoS queuing	Fixed or weighted (configurable ratio)		
VLAN support	802.1Q (up to 15 concurrent traffic VLAN)	802.1Q (up to 4K VLAN entries)	
Spanning Tree Protocol	802.1D-2004 RSTP, 802.1D-1998 STP		
MEF	-	MEF 9 (EPL, EVPL), MEF 14 (EPL)	
Mechanical & Electrical			
Power consumption	SP: 22 - 33 W; HP: 39-45 W	SP: 27 - 40 W; HP: 44 - 52 W	ODU: SP: 13 - 27 W; HP: 21 - 39 W IDU: 20 - 30 W
Weight, lbs	7.72	8.59	IDU: 6.83 ODU: 7.72
Temperature Range, F	-27.4° to 131°		IDU: 23° to +113° ODU: 27.4° to +131°
Dimensions: HxWxD, in	11.2x11.2x3.1		IDU: 1U rack (1.77x16.92x9.44) ODU: 11.34x11.34x3.15
Operational use	outdoor weather protected, 100% condensing		ODU: outdoor weather protected 100% condensing; IDU: 5-90%, non-condensing

CFIP FODU/ODU Ports



CFIP-106

- RJ-45
- 18-pin (balanced T1)
- BNC (RSSI)
- Twin BNC (Serial)



CFIP Lumina (Optical)

- 1 or 2 optical ODC (Eth)
- 48V DC (Power)
- BNC (RSSI)
- Twin BNC (Serial)



CFIP Lumina (Electrical)

- 1 or 2 electrical RJ-45 (Eth)
- 48V DC (Power)
- BNC (RSSI)
- Twin BNC (Serial)



CFIP Lumina (Hybrid version)

- 1 electrical RJ-45 & 1 optical ODC (Eth)-
- 48V DC (Power)
- BNC (RSSI)
- Twin BNC (Serial)



CFIP Phoenix

- N-Type (data+power)
- BNC (RSSI)

CFIP-106, CFIP Lumina and CFIP Phoenix Total payload capacity (Mbps)

Modulation	Channel bandwidths (MHz)														
	CFIP - 106 FODU			CFIP Lumina FODU					CFIP Phoenix IDU						
	10	20	30	20	30	40	50	56	5	10	20	30	40	50	56
QPSK	12	24	38	24	38	50	63	72	5	12	22	37	49	61	72
16APSK	24	49	75	49	74	98	125	135	11	24	45	74	98	124	135
32APSK	30	63	96-106	62	95	127	157	186	14	30	57	95	127	156	182
64QAM	40	83-93	-	82	123	163	207	241	18-20	40	75	123	163	206	240
128QAM	49-52	-	-	98	147	196	248	289	-	48-53	90	147	196	246	287
256QAM	-	-	-	115-125	172-184	229-245	289-312	337-366	-	-	105-115	172-184	229-245	287-312	335-363

SAF CFIP-106, CFIP Lumina and CFIP Phoenix ODU max Tx Power

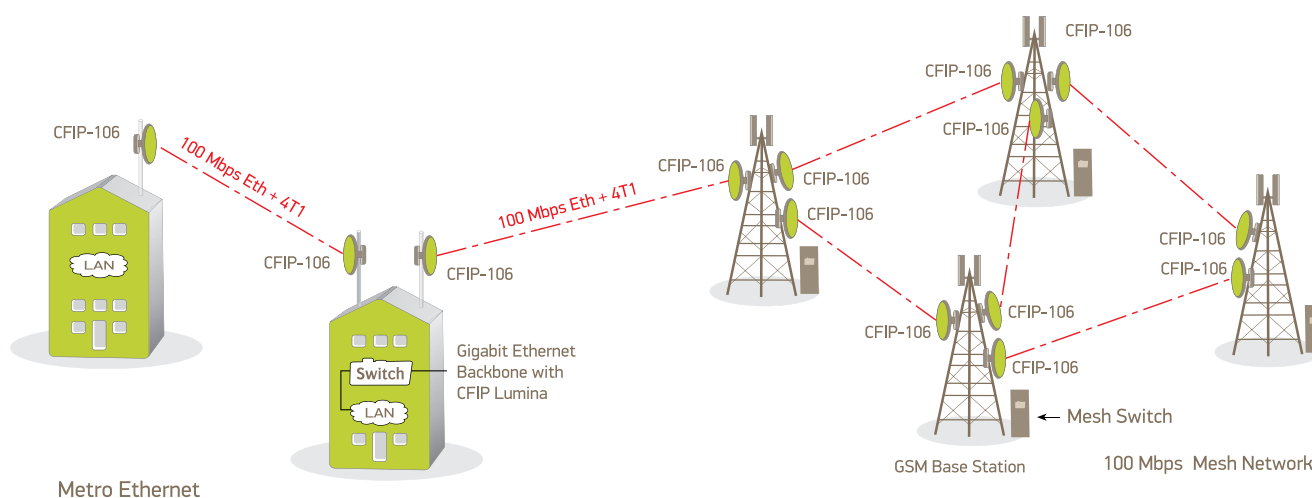
Modulation	Standard/High Tx Power, dBm				
	6 GHz	11, 13, 15 GHz	18, 23 GHz	24 GHz	38 GHz
QPSK	+19 / +27	+19 / +25	+19	-20 to 0	+17
16APSK	+18 / +26	+18 / +24	+18	-20 to -1	+16
32APSK	+17 / +25	+17 / +23	+17	-20 to -2	+15
64QAM	+15 / +23	+15 / +21	+15	-20 to -4	+13
128QAM	+15 / +23	+15 / +21	+15	-20 to -4	+13
256QAM	+12 / +20	+12 / +18	+12	-20 to -7	+10

CFIP-106 FODU Highlights

- **Excellent system gain** allows to efficiently upgrade PDH radios to 106 Mbps capacity without increasing antenna sizes;
- **Low power consumption** enables Power over Ethernet and use of solar/wind energy;
- **ACM and ATPC** for high availability and high density deployments;
- **Very high flexibility** allows to configure the system to various channel bandwidths, modulation schemes and capacity settings.
- **SNMP** support for remote network monitoring and management.

Metro Ethernet and Mesh Networks with CFIP-106 FODU

- Suitable for any network topology – star, ring, mesh networks;
- Full Outdoor solution with Power over Ethernet wires is efficient for All-Outdoor BST connectivity,
- Last mile access for customers with high capacity requirements
- SAF CFIP Lumina can be used for Gigabit Ethernet backhaul

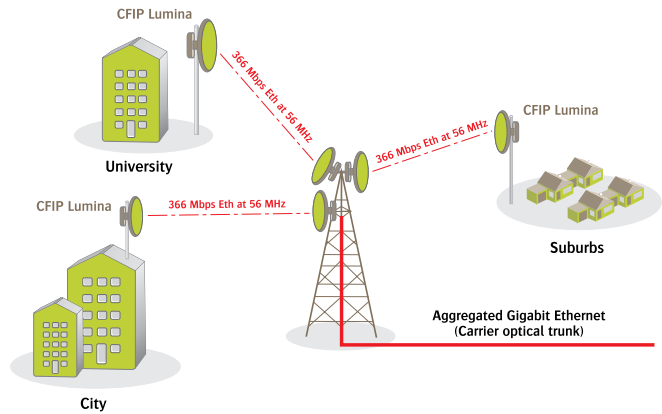


CFIP Lumina Highlights

- Leading edge technology with **up to 256QAM modulation and 56MHz channel bandwidth** allows high capacity throughput up to 366 Mbps;
- **Optical Ethernet connections** provide **excellent protection against lightning strikes** and allow long distances between user equipment and the radio;
- **2 Gigabit Ethernet ports** provide the convenience of having separate ports for management (both basic and advanced) and user traffic;
- **Up to 4094 concurrent VLAN traffic** allows building many port-to-port networks paths for specific client services;
- **Jumbo frame size supports up to 9728 bytes**, which allows using longer header info (VLAN, MPLS) and transmitting more useful content and less headers, thus gaining on total throughput;
- **ACM and ATPC** for high availability and high density deployments.

Carrier Gigabit Ethernet trunk distribution with CFIP Lumina FODU

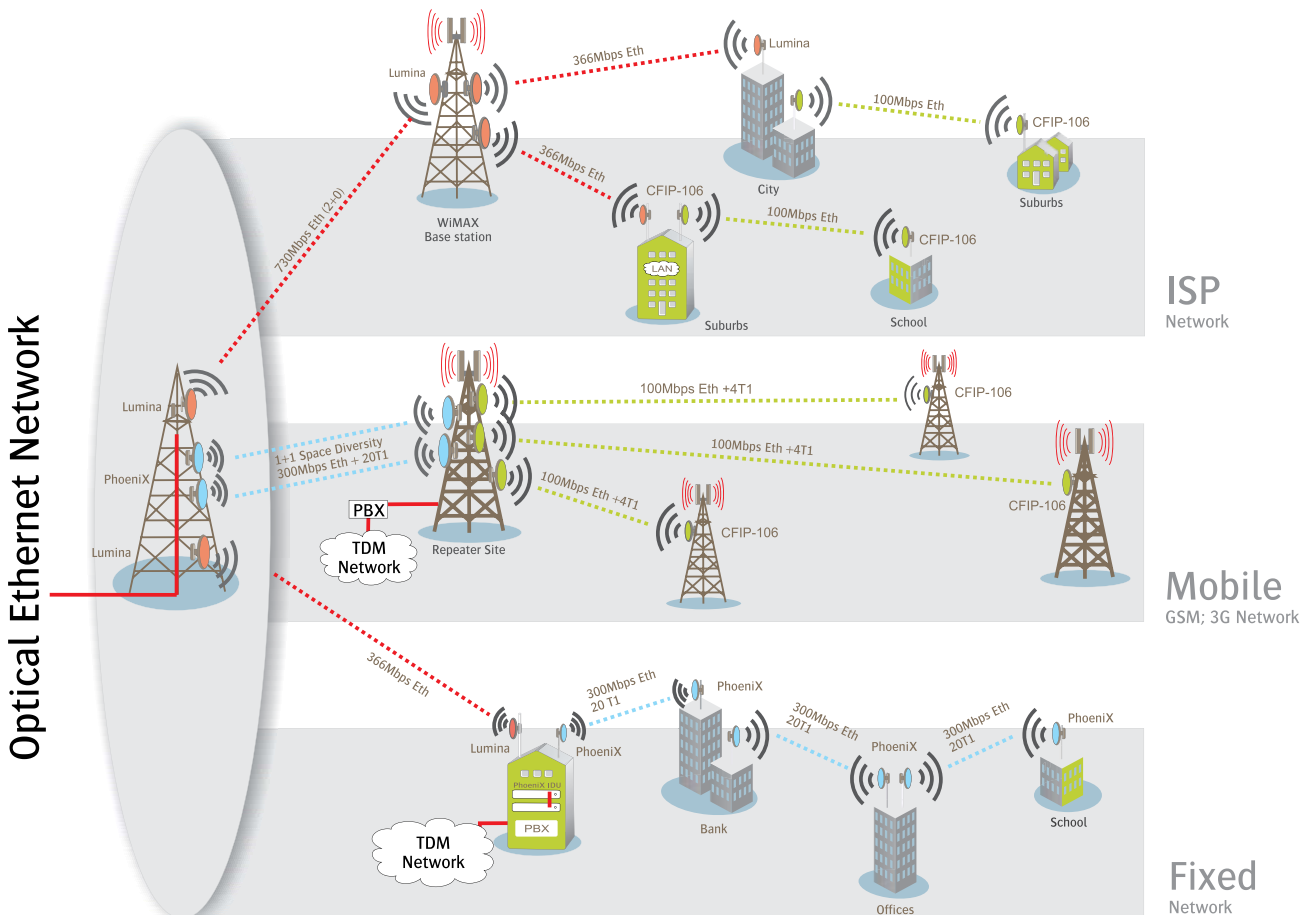
- Suitable for any network topology – star, ring, mesh networks
- Ideal for wireless extensions of fibre optics networks
- Designed for Ethernet backhaul applications

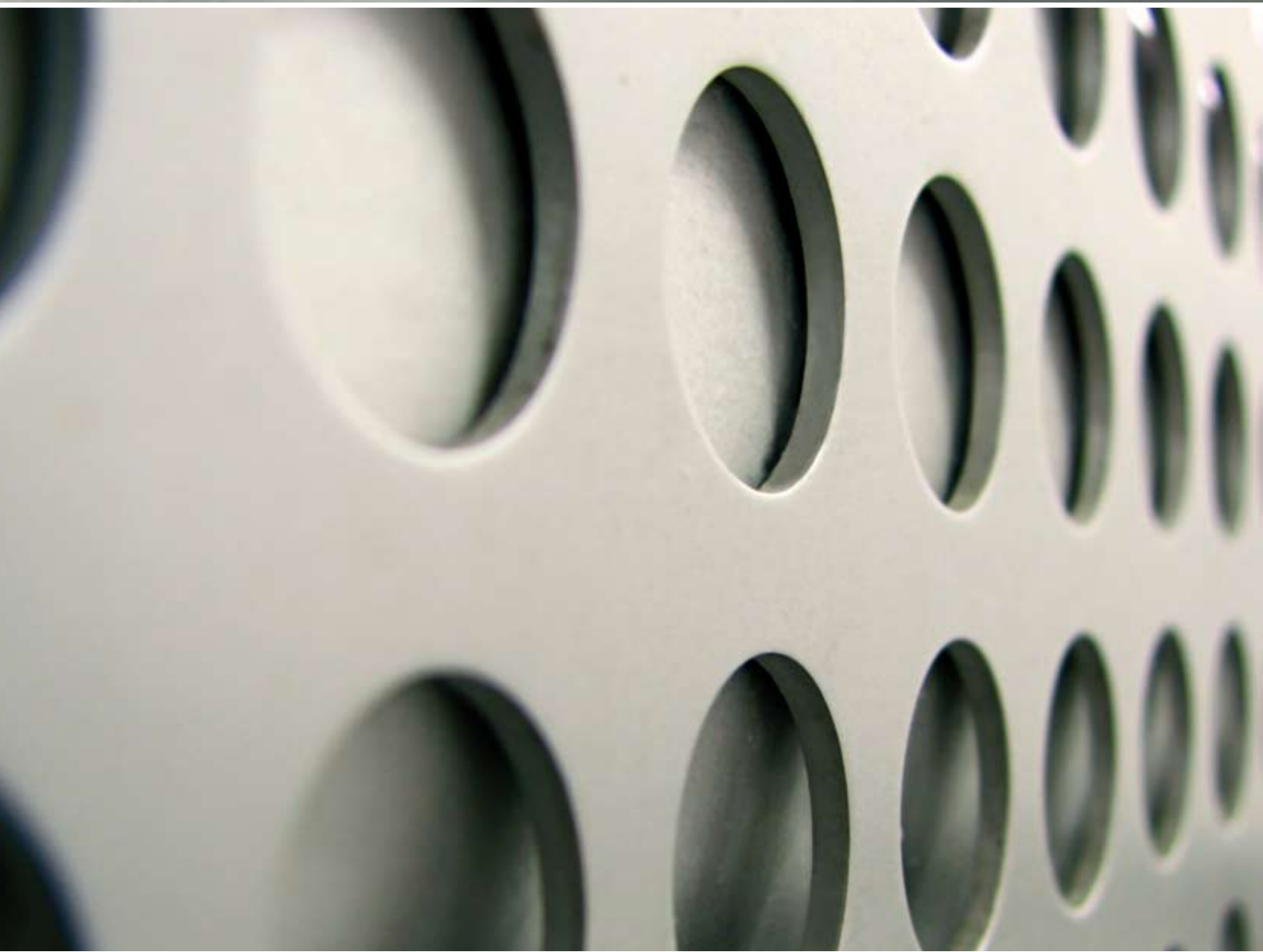


CFIP Phoenix Highlights

- High capacity system with **up to 20 T1 and up to 363 Mbps Gigabit Ethernet** - ideal for building **hybrid networks** to facilitate **transition from TDM to IP**;
- Industrial grade **fanless design** increases reliability and enables low power consumption;
- Leading edge technology utilizing **256QAM modulation and 56MHz channel bandwidth** allows high capacity throughput up to 366 Mbps;
- Excellent **upgrade for existing PDH split mount systems**;
- **Up to 4094 concurrent VLAN traffic** allows building many port-to-port networks paths for specific client services;
- **Jumbo frame size support (up to 9728 bytes)**, allows using longer header info (VLAN, MPLS) and transmitting more useful content and less headers, thus gaining on total throughput.

Application diagram of CFIP Product line





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