



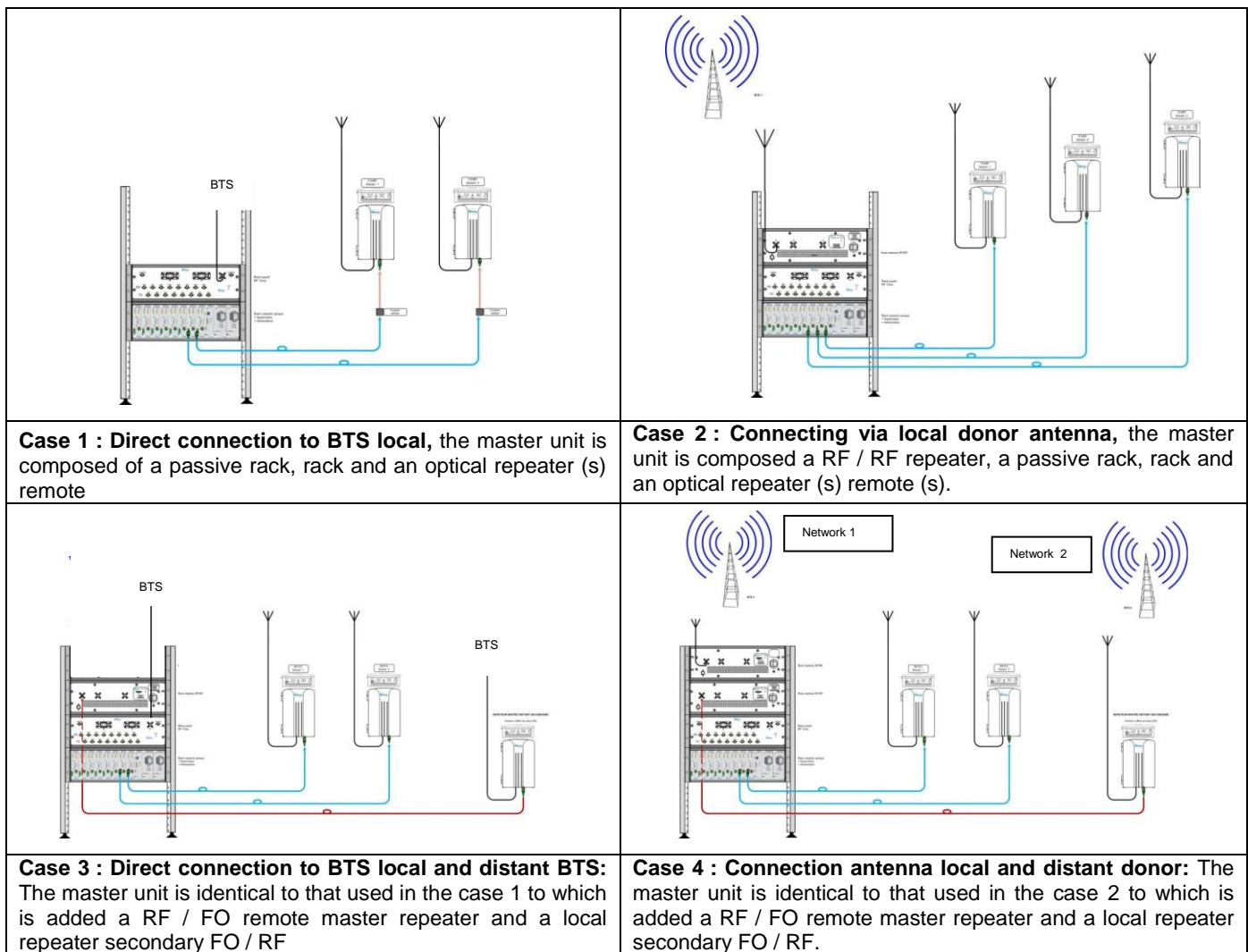
❖ **General description :**

The **OPTIREP™ GSM-R 900 MHz** system is a flexible device that ensures GSM-R 900 MHz radio coverage in rail tunnels, stations along the railway tracks ...

Equipment can be remotely managed using its supervisory module (WEB server / integrated SNMP).

The flexibility of the system **OPTIREP™ GSM-R 900 MHz** allows multiple combinations according to the specificities of every site.

The signal can come from different sources and therefore to present several scenarios:



Master optical unit (OMU)

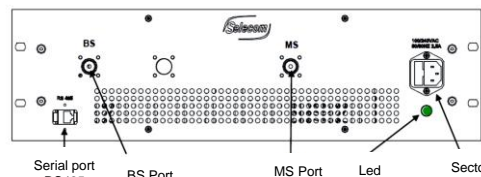
The optical master may be comprised of several racks depending on the signal source. Two racks will be used for a remote BTS receipt in which will be added a third rack for a reception antenna via donor.

3 Racks 3U x19" :	Rack 1 (direct BTS)	Passif rack
	Rack 2 (direct BTS)	Up to 8 transceivers RF / FO optic rack (possibility of tripling the optical rack)
		1 monitoring module
	Rack 3 (reception with antenna)	Up to 2 power 230 VAC or 48 VDC redundant (optional)
Alimentation	Tension	230 VAC or 48 VDC
	Redundancy	1 or 2 redundant supply units , plug & play
Temperature range		0°C / +50°C
Cooling		Forced cooling
❖ Monitoring (optional)		
Protocols		HTTP, SNMPv2
Remote control		GPRS modem GSM or GSM -R (optional) M2M SIM card required
❖ Redundancy OMU 1+1 (optional)		Automatic switching in case of failure of the fiber transmission system



RF/RF Master repeater

As part of a local reception via antenna, **RF / RF repeater** must be set up to amplify the signal before being injected into the passive rack.

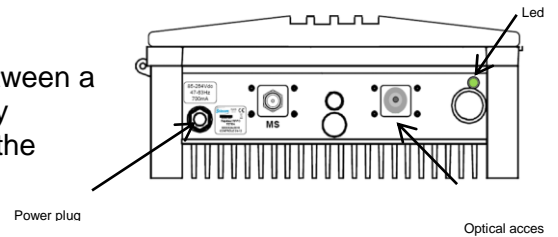


RF/RF Rack illustration

Frequency band	GSM 900 MHz MP		GSM 900 MHz HP	
	RX Band TX Band	876 MHz – 880 MHz 921 MHz – 925 MHz		
Bandwith	Adjustable bandwidth, depending on the operator band, 15MHz max. Adjustable center frequency across the GSM band			
Gain	Adjustable from 50 to 80 dB (Step to 1 dB)		Adjustable from 60 to 90 dB (Step to 1 dB)	
Ripple in band	= ± 2 dB			
Nominal output power	TX	RX	TX	RX
1 Channel	+ 32 dBm	+ 15 dBm	+ 39 dBm	+ 18 dBm
2 Channels	+ 27 dBm	+ 10dBm	+ 36 dBm	+ 15 dBm
3 Channels	+ 22 dBm	+ - 4dBm	+ 33 dBm	+ 11 dBm
Power parasitic lines	≤ - 36 dBm			
Selectivity	With saw filter 30dB @ +/-400KHz 40dB @ +/-600KHz 45dB @ +/-1MHz 55dB @ +/-5MHz and beyond			
Noise factor gain max	≤ 6 dB			
Propagation time	≤ 8µs			
Edge modulation measures	RMS EVM ≤ 3% Max PK EVM ≤ 7%			
Power supply	230 Volts AC Supply AC integrated into the box Power supply 48 VDC +/- 20% optional In compliance with the standard IEC 60950 / IEC			
Consumption	100 W		175 W	

RF/FO Remote secondary master repeater

The remote secondary repeater provides a radio link between a BTS and the optical master rack. The remote secondary master repeater provides a radio link between a BTS and the optical master rack.



Simple box illustration

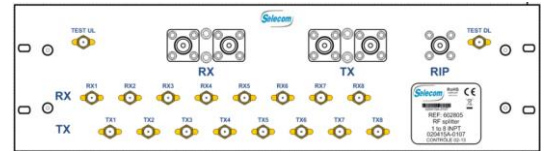
❖ RF/FO characteristics		Uplink RX	Downlink TX
Frequency range		876-880 MHz	921-925 MHz
DL Nominal output power	1 Channel	+ 37 dBm	
	2 Channels	+ 34 dBm	
	4 Channels	+ 31 dBm	
	8 Channels	+ 28 dBm	
Noise factor		≤ 4 dB @ Gain max	
Ripple in the band		≤ 2dB	
Downlink/uplink rejection		> 80 dB	
Intermodulation		≤ -36 dBm	
Group time		≤ 1 μs	
RF connector		Outdoor box: 7/16 or N-female	
❖ Optical interface			
Wavelength		1310 nm – 1550 nm ± 20 nm or CWDM (1550/1510/1530/1570nm)	
Optical output power		4 dB optical ± 2 dB	
Compression point		> 15 dBm	
Optical connector		E2000/APC/APC	
Optique fiber		Monomode (G652 and G655)	
Number of optical output		1 output	
❖ Mechanical characteristics			
MTBF		≥ 200 000 h	
Outdoor box dimensions IP65/IK9		224 x 429 x 582 mm	
Temperature range		-25°C / +55°C	
Weight		28 kg	
Supply		230 VAC or 48 VDC/ 85 VA	
Monitoring		Centralized monitoring module via a serial communication bus	

FO/RF secondary master Repeater local

The FO/RF secondary master repeater is adapted to the interface between the passive rack and OMU

Passive Rack

The passive rack allows injection of RF signals on optical fibers 8 in the downlink (BS to MS) and recover the RF signals from up to 8 optical fibers in the uplink (MS to BS). Depending on the site and requirements, several versions can be offered.

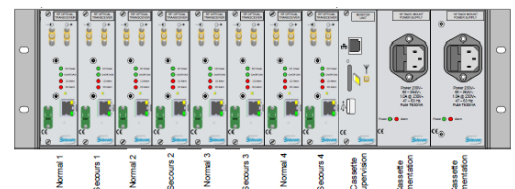


RF Interface		
Frequency range		Broadband RIP optional kit supplied includes a diplexer which sets different bands GSM-R
Number of RF Input/output	Or BTS access	1 BTS access (RX/TX multiplexed)
	RF_RF I/O	1 input RX/1 output TX
	Input/Output	8 input RX / 8 outputTX
	Measurement test point (optional)	1 Test access RX / 1 test access TX
	RIP access	1 Accès (RX/TX multiplexé)
❖ Mechanical characteristics		
Dimensions (L x H x D)		483 (19") x 133 (3U) x 500 mm
RF Connectors	Input	N female
	Output	QMA female => Quick connector without tools
	Access tests (optional)	SMA female

Optical rack

The optical master is a 3U rack 19". It can be fitted with 8 optical slots, a monitoring module and two parallel supplies: each capable of powering the full rack. These power supplies are available in 230VAC or optional 48VDC.


A backplane bus distributes to each slot power supplies and the RS485 connections (overall control system) to each slot.

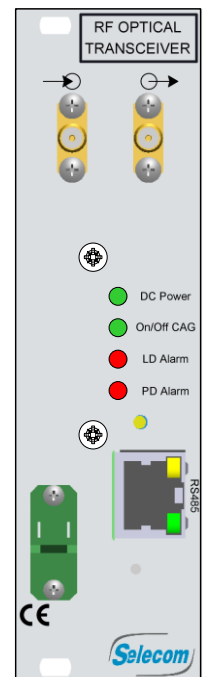


Mechanical characteristics	
Dimensions	Rack 19" prof.290mm
Weight	3.500 kg

RF/FO transceiver

The transmitter receiver RF / FO is an optical transmitter that converts the input RF signals into optical signals for transmission via FO to remote repeaters FO / RF.

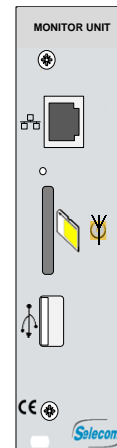
 RF Characteristics	
Frequency range	300 – 2500 MHz
RF input power	-10 dBm
RF output power	< -15 dBm
VSWR	1.3 : 1
RF Connector	QMA female => <i>Quick connector without tools</i>
❖ Interface optique	
Wavelength	1 repeater by fiber (Star) Downlink: 1310 nm Uplink : 1550 nm
	Several repeater by fiber (daisy-chain) Downlink: 1310 nm Uplink: 1510, 1530, 1550, 1570 nm
Optical output power	4 dBm ± 2 dB
IP3 output	≥ +30 dBm
Optical connectors	E2000 APC
Optical fiber	SMF (G652 et G655)
Number of optical outputs	1 per Transceiver (DL + UL on the same optical fiber)
❖ Mechanical & Electrical characteristics	
Dimensions (L x H x D)	35 mm x 133 (3U) x 100 mm
Poids	0,486 kg
Power consumption (For each transceiver)	6 W
Maintenance	Plug & Play
Supervision	Centralized to monitoring module via a serial bus.



Monitoring module (optional)

The Monitoring module allows remote access is possible with all the supports using IP (GSM-R modem, satellite). All "centralized" units (FO/RF Repeater) are supervised (via fiber optics) by the subset in which the master supervisor module is (WEB / SNMP).

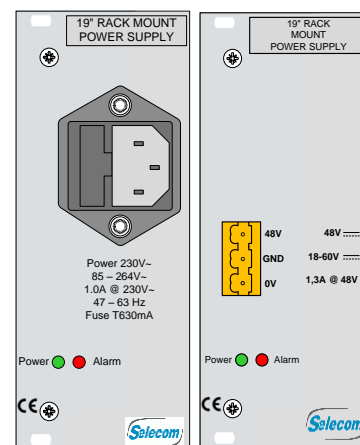
✚ Characteristics	
Protocols	HTTP, SNMPv2
Remote Control	GPRS Modem (GSM) SIM M2M necessary
Connectors	RJ45 M2M SIM Card Slot
Maximum number of optical channels	Can monitor up to 16 pairs of receiver / remote repeater via the serial bus
Mechanical & electrical characteristics	
Dimensions (L x H x D)	35 mm x 133 mm (3U) x 160 mm
Weight	0.524 kg
Power consumption	5 W
Maintenance	Plug & Play



Supply module

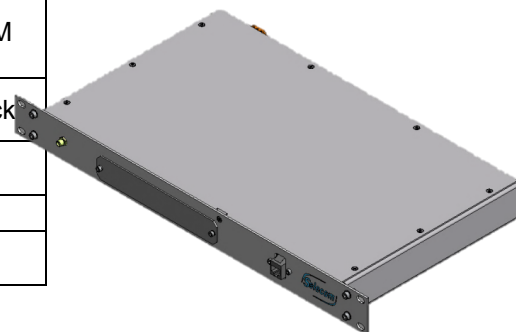
Built-in optical rack, the supply module is available in 230 VAC or 48 VDC.

✚ Characteristics	
Dimensions (L x H x D)	35 mm x 133 mm (3U) x 160 mm
Weight	0.720 kg
Supply	230 VAC or 48 VDC
Maintenance	Plug & Play



Routeur GSMR

✚ Characteristics	
Connectors	RJ45 (for monitoring module) SIM Card Slot GSM-R SMA Connector M2M (for the antenna)
Dimensions (L x H x D)	416 mm x 44mm (3U) x 260 mm (19" 1U rack)
Weight	1.45 Kg
Power supply	20 W
Power consumption	230 VAC or 48 VDC (A choice)



Environmental specifications

The system complies with the following standards:

ETSI radio standards	TS101 789-1
CEM standards	301 489-1 (part18)
Electric Safety Standards	En 60950-1

Repeaters

Built in a cabinet meeting the IP65 standard, routers can be installed in wall inside and outside and in the most challenging environments.

The rackable Version (3U or 5U) is intended for indoor installations in order to integrate mechanically in a 19".

The range of SELECOM repeaters is segmented by:



Simple box

- **Two types of mechanical :**
 - ✓ Box version (wall mounting or pylon interface),
 - ✓ Rackable version (19"- 3U or 5U),



Double box

- **Two powers :**
 - + 32 dBm MP,
 - + 39 dBm HP,
- **A power on Repeater FO/RF :**
 - +47 dBm



3 U Module

Mechanical characteristics			
Dimensions & weight	Puissance	+ 32 dBm	+ 39 dBm + 47 dBm
	Outdoor box	H 578 mm x L 429 mm x P 224 mm 25 Kg	H 578 mm x L 444 mm x P 353 mm 49 Kg
	Indoor box	Rack : H3U x L 19" x P 452 mm 16 Kg	Rack : H 5U x L 19" x P 452 mm 35 kg