

Exhibit 1006

Castel San Pietro Terme, 28 July 2011

Equipment Authorisation Division
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

FCC ID: XM2-LOWPOWER6

Product Name: Optical Systems Remote Unit TRL7S8SC8A9S19AWAS with Master Device

Request for Confidentiality

Pursuant to Sections 0.457 and 0.459 of the commissions rules, we hereby request that the following documents be held confidential:

- Schematic diagrams
- Block diagram
- Tune up information

These materials contain trade secrets and proprietary information and are not customarily released to the public. The public disclosure of this information might be harmful to the company and provide unjustified benefits to our competitors.

Dated 28 July 2011

By: Alessandro Brunelli **ALESSANDRO BRUNELLI**
Signature **Printed**

Title: CERTIFICATION ENGINEER

On behalf of : TEKO TELECOM

Telephone: +39 051 6946811

TEKO TELECOM S.p.A.
Via Meucci, 24/a
40024 CASTEL S.PIETRO T. (BO)
P.IVA e C.F. 02186561201

Castel San Pietro Terme, 28 July 2011

Nemko Canada Inc.
303 River Road
Ottawa, Ontario, Canada
K1V 1H2

FCC ID: XM2-LOWPOWER6

Product Name: Optical Systems Remote Unit TRL7S8SC8A9S19AWAS with Master Device

REUSE TEST REPORT

The multiband low power units are engineered following a fully modular philosophy and thanks to this it will be possible to create every combination of bands reusing the same circuitry.
Due to this design methodology every section (band amplifier) will have the exact RF schematics, PCB layout, component, RF level setup, modulation type and consequently RF performance for each frequency band and so this allow us the reuse of test data obtained during previous measuring sessions.
External antenna is not provided with equipment.

The bands were already tested in other projects except for a new band. Details are:

SMR700: 698-787 MHz

(see FCC ID: XM2LOWPOWERL, see test reports: 148253-1_TRFWL and 148253-2_TRFWL)

SMR800C: 817-869 MHz (new band)

AMPS: 824-894 MHz

(see FCC ID: XM2-LOWPOWER, see test reports: 131640-1_TRF_EMC and 156523-1_TRF_WL)

SMR900: 896-940 and 901-941 MHz (see FCC ID: XM2LOWPOWERL)

(see FCC ID: XM2LOWPOWERL, see test reports: 148253-3_TRFWL and 148253-4_TRFWL)

PCS: 1850-1995 MHz (see FCC ID: XM2-LOWPOWER)

(see FCC ID: XM2-LOWPOWER, see test reports: 131640-2_TRF_EMC and 156523-2_TRF_WL)

AWS: 1710-2155 MHz (see FCC ID: XM2-LOWPOWER)

(see FCC ID: XM2-LOWPOWER, see test reports: 131640-3_TRF_EMC and 156523-3_TRF_WL)

Dated 28 July 2011

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P.IVA e C.F. 02186561201



TEKO TELECOM S.p.A.

Via Meucci, 24/a

40024 Castel S. Pietro Terme (BO) – Italy

Tel +39 051 69 46 811 – Fax +39 051 94 84 73

www.tekotelecom.it



REMOTE UNIT TRL7S8SC8A9S19AWAS EXTERNAL PHOTOS





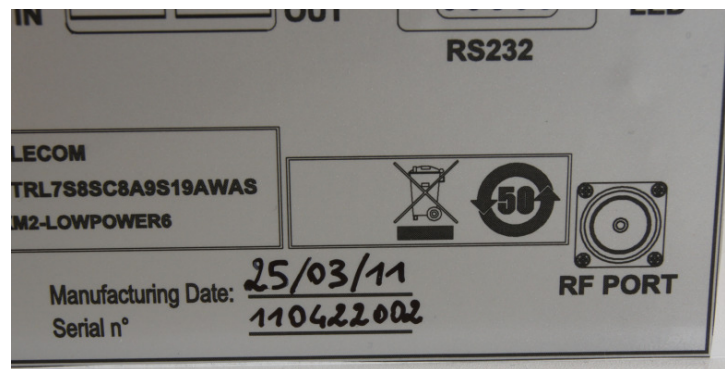
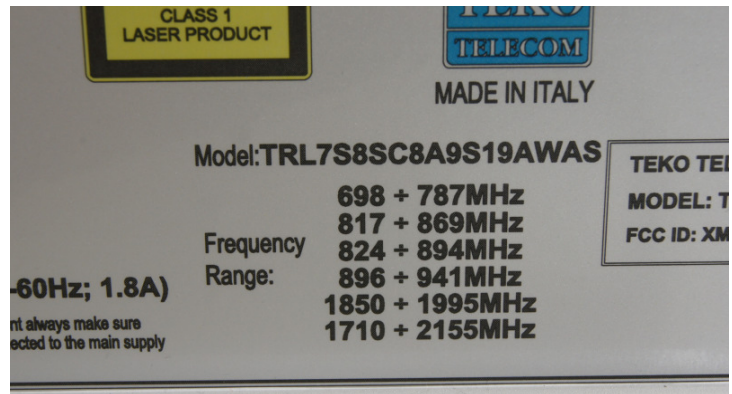
TEKO TELECOM S.p.A.

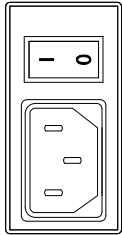
Via Meucci, 24/a

40024 Castel S. Pietro Terme (BO) – Italy

Tel +39 051 69 46 811 – Fax +39 051 94 84 73

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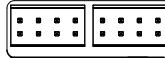


**OPTICAL
DL/UL WDM**

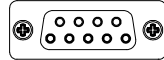


MADE IN ITALY

**EXT
IN**



**EXT
OUT**



RS232



LED

**AC MAINS
(100-240V~; 50-60Hz; 1.8A)**

When working on the equipment always make sure
that the equipment is not connected to the main supply

Model: TRL7S8SC8A9S19AWAS

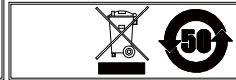
**Frequency
Range:**

**698 + 787MHz
817 + 869MHz
824 + 894MHz
896 + 941MHz
1850 + 1995MHz
1710 + 2155MHz**

TEKO TELECOM

MODEL: TRL7S8SC8A9S19AWAS

FCC ID: XM2-LOWPOWER6



RF PORT

**Manufacturing Date:
Serial n°**

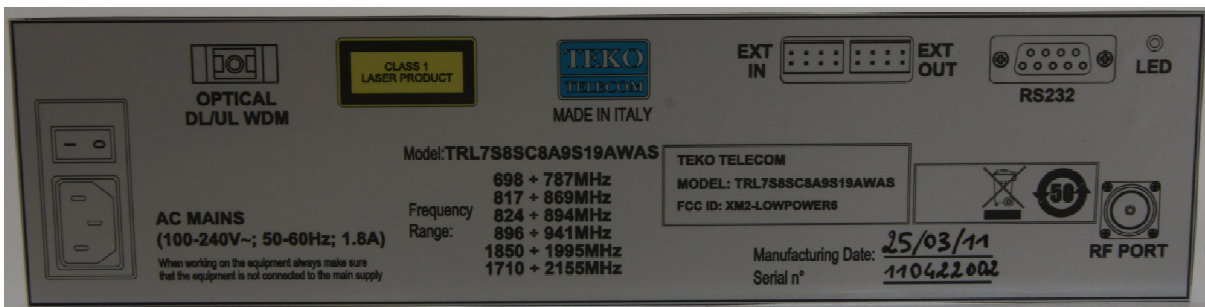
Wilson Exhibit 1006



TEKO TELECOM S.p.A.
Via Meucci, 24/a
40024 Castel S. Pietro Terme (BO) – Italy
Tel +39 051 69 46 811 – Fax +39 051 94 84 73
www.tekotelecom.it

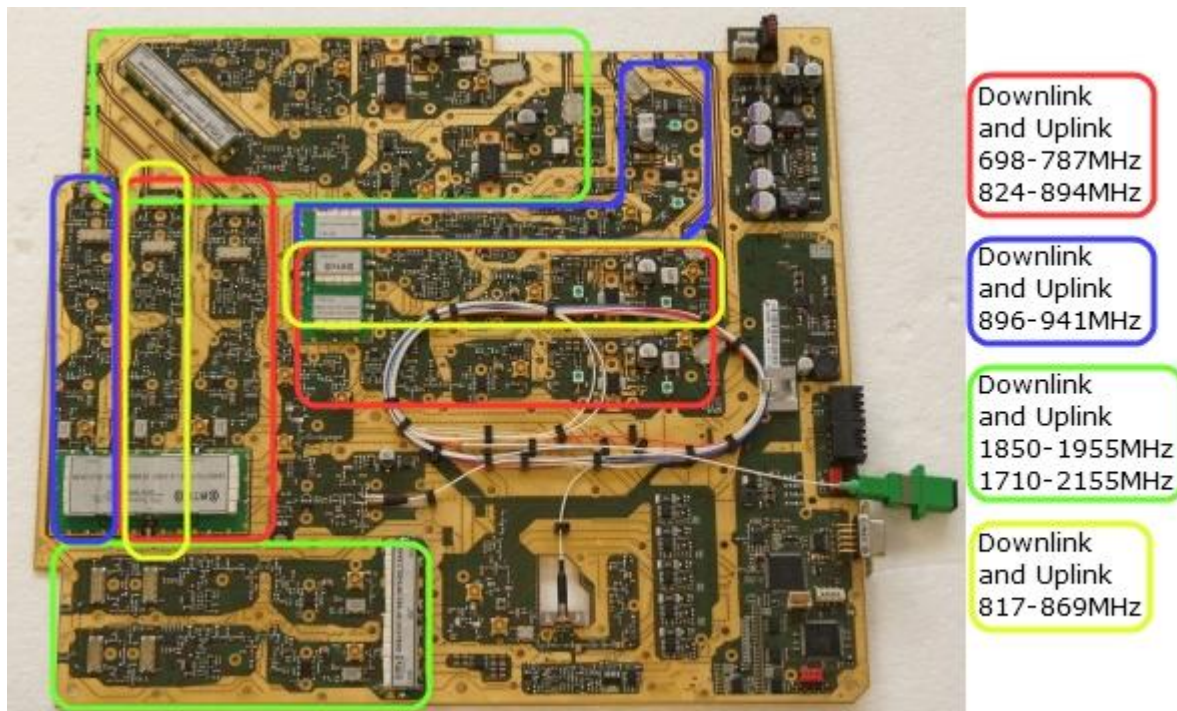


LABEL LOCATION AND LABEL CONTENT



INTERNAL COMPARATIVE PHOTOS

INTERNAL PHOTO OF TRL7S8SC8A9S19AWAS



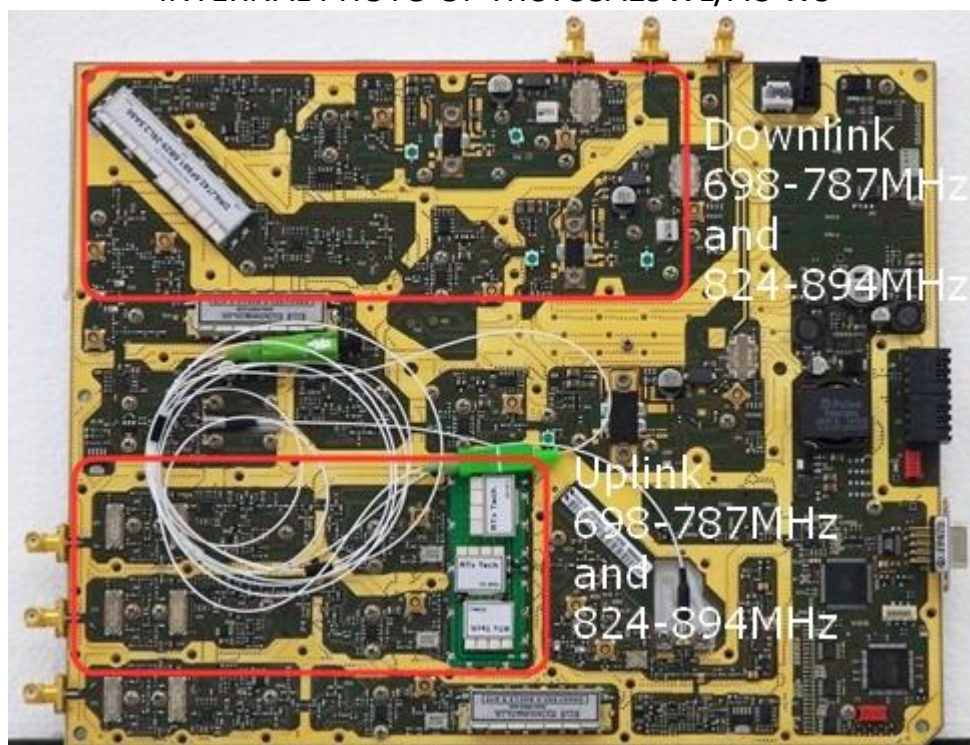
In this image, each colour represents a different section (band amplifier) on the new equipment. In the photos below, that represent previous and already tested equipment, you can see the same section highlighted with the same colour of the photo above.

The yellow section is the new one and it is included in the new disegned filter.

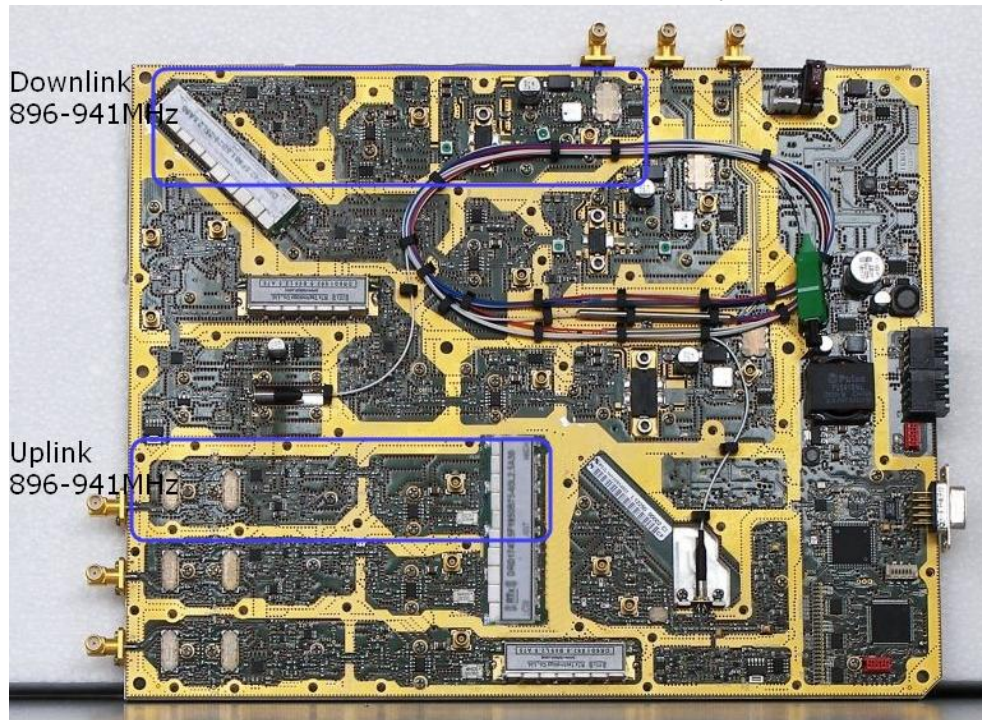
INTERNAL PHOTO OF TRU8A19A WWS/AC-WL



INTERNAL PHOTO OF TRU7S8A19WL/AC-WS



INTERNAL PHOTO OF TRU8S9S19WL/AC-WS



B – Remote Units

Remote Units distribute wireless signals throughout the area to be covered ; they can be installed up to 20km (12.4miles) from the Master Unit site.

Remote Units can be Single, Dual or Tri-band with different power classes: Very High, High, Medium and Low.



Single, Dual or Tri-band Very High, High and Medium Power Remote Unit



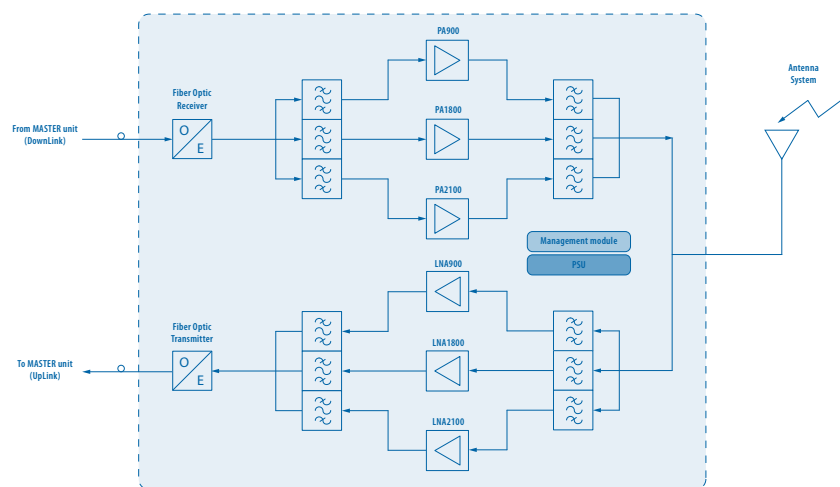
Single, Dual or Tri-band Low Power Remote Unit

Remote Units are equipped with the Fiber Optic Receiver and Transmitter module (for Optical to RF and RF to Optical conversion) power amplifiers and filtering.

A single Master Unit can drive up to 144 Remote Units. Various network structures can be supported by the Master Unit: the Remote Units of the same Optical System can be deployed with a point-to-point connection (star-configuration - using one fiber optic per Remote Unit) or with cascading of up to 5 Remote Units using a single fibre and optimized optical couplers.

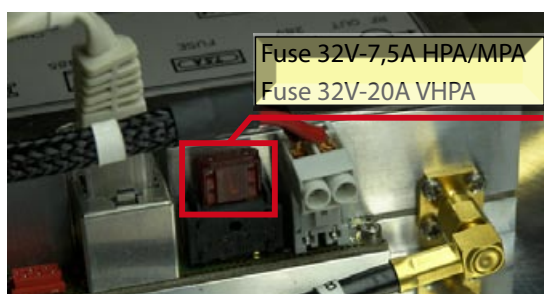
The following figure shows the Tri-band Remote Unit block diagram: in down-link the optical signal from Master Unit is converted into an RF signal by the Fiber Optic Receiver module. RF signals, filtered by the triplexer, are amplified by Low, Medium, High or Very High Power amplifiers (Low, Medium, High or Very High Power Remote Units), filtered and transmitted through an antenna or a passive distribution system.

In up-link the RF signal is filtered by the triplexer. The three RF signals are amplified by Low-Noise Amplifiers, filtered and then converted into an optical signal by the Fiber Optic Transmitter module. The signal is transmitted via fiber optics to the Master Unit.

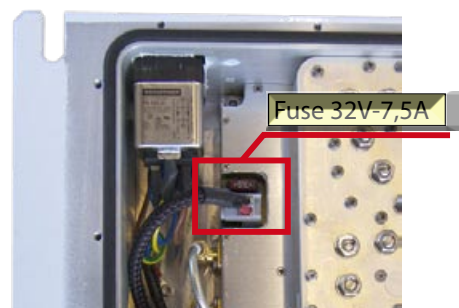


Example: Tri-band Remote Unit block diagram

Please Note: each final power amplifier is protected by a fuse.



Very High Power/High Power/Medium Power final amplifiers fuse position and electrical rating



Low Power final amplifier fuse position and electrical rating

The management module collects information relevant to the various modules. An RF modem allows data communication over fiber between Remote Unit and Master Unit.

TRL7S8SC8A9S19AWAS 6-BAND LOW POWER REMOTE UNIT

TRL7S8SC8A9S19AWAS 6-Band Low Power Remote Unit operating in the SMR700, SMR800 Commercial, AMPS850, SMR900, PCS1900 and AWS1721 bands, belongs to TEKOTELECOM Optical System, the most advanced cost-effective flexible Multi-Band and Multi-Operator solution for cellular coverage and capacity distribution.

TEKOTELECOM Low Power Remote Units have been expressly conceived for high quality of service and easy set-up:

- Automatic Gain Control (AGC) on the optical link with the Master Unit, for constant gain independently from optical losses;
- Linear Power Amplifiers expressly designed for IMD reduction over the entire bandwidth;
- Automatic Level Control (ALC) in the UL path independent for each band, for maximum quality of service;
- RF Antenna Combiners expressly designed for Multi-Operator functioning, providing high insulation and low passive intermodulation (PIM);
- Wavelength Division Multiplexing (WDM) for Tx/Rx communications with the Master Unit over the same optical fibre;

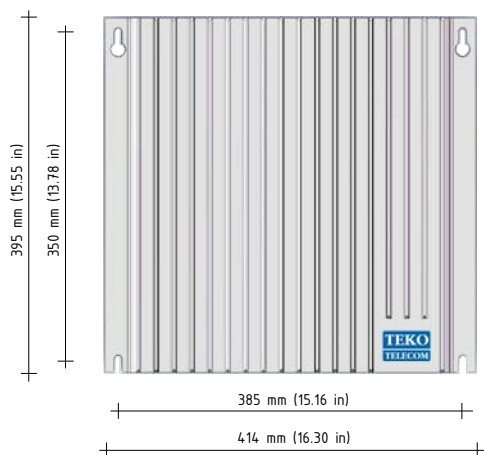
- Point-to-point and cascade connection with the Master Unit, for maximum flexibility of installation;
- Optical remote link up to 20 km (12.4 miles);
- New and innovative mechanical design, for easy installation and professional visual impact;
- Optional kit providing IP66 protection degree, for installation in harsh environments.

TEKOTELECOM Remote Units are available in a wide range of different executions as for:

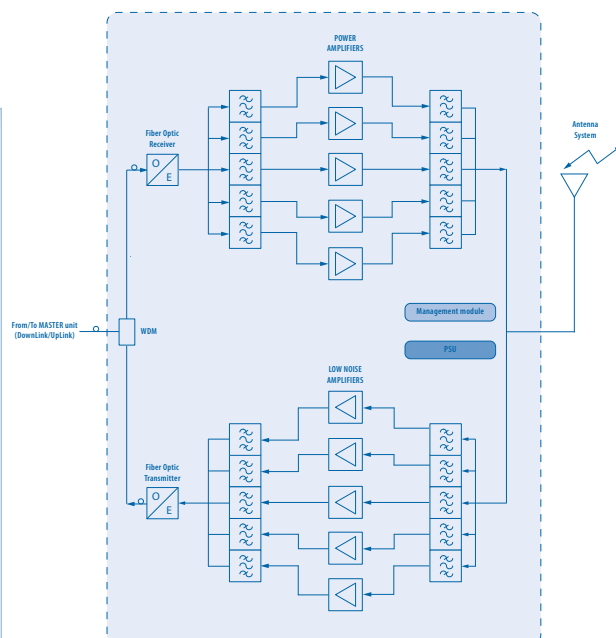
- Single-Band – Multi-Band,
- Operating frequencies from 380 to 2700MHz, complying with all the most important international standards for Mobile Communications and Public Safety,
- Low – Medium – High – Very High Power classes.

They represent the ideal solution for cellular coverage extension and capacity distribution in any indoor application, campuses, long tunnels as well as in several outdoor scenarios.

REMOTE UNIT
DRILLING TEMPLATE



REMOTE UNIT
BLOCK DIAGRAM



TRL7S8SC8A9S19AWAS 6-BAND LOW POWER REMOTE UNIT

6-BAND MULTI-OPERATOR OPTICAL SYSTEM WITH SMR700/SMR800 Commercial/AMPS/SMR900/PCS/AWS LOW POWER REMOTE UNIT	SYSTEM SPECIFICATIONS		SMR700	SMR800C(*)+AMPS	SMR900	PCS	AWS
	Uplink operating frequency band		698-716MHz 776-787MHz	817-848.5MHz	896.5-902MHz	1850 ÷ 1915 MHz	1710 ÷ 1755 MHz
	Downlink operating frequency band		728-757MHz	862-893.5MHz	935.5-941MHz	1930 ÷ 1995 MHz	2110 ÷ 2155 MHz
	Downlink Output Power GSM/TDMA (**) / CDMA (**)		29dBm (1 carrier)	29dBm (1 carrier)*	29dBm (1 carrier)	29dBm (1 carrier)	29dBm (1 carrier)
			23dBm (4 carriers)	23dBm (4 carriers)*	23dBm (4 carriers)	23dBm (4 carriers)	23dBm (4 carriers)
			17dBm (16 carriers)	17dBm (16 carriers)*	17dBm (16 carriers)	17dBm (16 carriers)	17dBm (16 carriers)
	Downlink Output Power WCDMA (***) / LTE (****)		29dBm (1 carrier)	29dBm (1 carrier)*	29dBm (1 carrier)	29dBm (1 carrier)	29dBm (1 carrier)
			26dBm (2 carriers)	26dBm (2 carriers)*	26dBm (2 carriers)	26dBm (2 carriers)	26dBm (2 carriers)
			23dBm (4 carriers)	23dBm (4 carriers)*	23dBm (4 carriers)	23dBm (4 carriers)	23dBm (4 carriers)
	Spurious emissions and intermodulation products		< -13 dBm (in the frequency band 9 kHz ÷ 12.75 GHz)				
	UL setting 1 (0 dB digital attenuation)	Noise Figure	6 dB	6 dB	6 dB °°	5.5 dB	5 dB
		IIP3	-17 dBm	-17 dBm	-17 dBm	-17 dBm	-17 dBm
	UL setting 2 (5 dB digital attenuation)	Noise Figure	7 dB	7 dB	7 dB °°	6.5 dB	6 dB
		IIP3	-12 dBm	-12 dBm	-12 dBm	-12 dBm	-12 dBm
	UL setting 3 (10 dB digital attenuation)	Noise Figure	10.5 dB	10.5 dB	10.5 dB °°	10 dB	9.5 dB
		IIP3	-7 dBm	-7 dBm	-7 dBm	-7 dBm	-7 dBm
	UL setting 4 (15 dB digital attenuation)	Noise Figure	15 dB	15 dB	15 dB °°	14.5 dB	14 dB
		IIP3	-3 dBm	-3 dBm	-3 dBm	-3 dBm	-3 dBm
6-BAND LOW POWER REMOTE UNIT TRL7S8SC8A9S19AWAS	Downlink RF gain, in Master Unit Tx		34 dB	34 dB	34 dB	34 dB	34 dB
	Uplink RF gain, out Master Unit Rx		47 dB	47 dB	47 dB	47 dB	47 dB
	Pass band ripple		± 1.5 dB	± 2 dB	± 1.5 dB	± 1.5 dB	± 1.5 dB
	Total processing delay (each path)/1m fiber		0.5 µs				
	Optical output power		6dBm				
	Optical connectors		SC-APC				
	Fibre type		Single mode SMR 9/125				
	Optical Link Budget		10 dB (AGC)				
	Nominal Optical Input Power		+6 dBm up to -4 dBm				
	RF connector		N (f)				
	RF return loss		13dB				
	Operating Wavelength		1550 nm ± 20 nm				
	Operating temperature range		-20°C up to +55°C (-4°F up to +131°F)				
	Cooling		Passive (natural convection)				
	Power supply		85÷264Vac (50-60Hz) (/AC version); -72 ÷ -36Vdc (/48 version)				
SYSTEM SUPERVISION AND CONTROL	Power consumption		150 W				
	Dimensions		approx 414 x 395 x 144 mm (24.41 x 16.34 x 10.24 in) (max volume - heat sinks, handles and connectors included)				
	Weight		approx 19 Kg (41.9lbs)				
	Degree of protection		IP32 (box) IP66 (with optional protection kit)				
SYSTEM SUPERVISION AND CONTROL	Commands		RF on/off · RF attenuation on each DL and UL path · 4 external control ports				
	Supervision and alarms		Summary · Power Supply · Optical UL and DL failure · RF UL and DL failure Temperature · 4 external alarm inputs - Composite output power				
	Remote Control		Signalling and supervision over fibre from Master Unit to Remote Unit and vice versa				

All values are typical at 25°C (77°F) and 0 dBm received optical power unless otherwise specified. Downlink output power measured at antenna port.

(*) Commercial portion of SMR800 band

(**) Compliant with CDMA2000-3GPP2 specifications (C.S0051-0) and FCC regulations, 8.5dB PAR.

(***) WCDMA carriers TM1-64DPCH 60% clipping, 8.5dB PAR, compliant with 3GPP specifications (TS 25.143) and FCC regulations.

(****) Compliant with 3GPP specifications (TS 36.143) and FCC regulations, 8.5dB PAR.

° At band edges 891.5-893.5MHz 27dBm composite

°° At band edges 896.5-898.5MHz Noise Figure 2dB higher

Specifications subject to change without notice.

Teko Telecom S.p.A. - info@tekotelecom.it

Via Meucci 24/a - 40024 Castel San Pietro Terme (BO) - Italy Tel. +39 051 6946811 - Fax +39 051 948473

Bill of Materials for 0054130.sch on Tue Nov 02 10:49:09 2010													
ITEM	Reference									VALUE	TEKO-CODE		
1	C11									0.9pF	05	051	0109
2	C160 C791									1.5pF	05	051	0115
3	C454 C485									2.2pF	05	051	0125
4	C185									3.3pF	05	051	0135
5	C165 C322 C328 C373 C378 C787									3.9pF	05	051	0140
6	C31 C41-42 C213 C218 C516 C535 C637 C665 C882 C887 C927									6.8pF	05	051	0160
	C932												
7	C142 C350 C498-499									TBD			
8	C7 C14 C57-58 C72 C79 C86 C89-90 C92-94 C98 C100 C112-113									100nF	05	041	0275
	C115 C125-126 C128 C205-207 C244-245 C257 C260 C266 C269												
	C275 C318-320 C356-358 C393-394 C401-402 C409-410 C459 C461												
	C489-490 C502 C545 C553 C561 C594 C596 C598-599 C615 C654												
	C657-658 C682 C685-686 C707 C717-731 C739 C763 C765 C781												
	C810-811 C816 C836 C845 C852-853 C860-861 C869-870 C879-880												
	C923-925 C960-961 C968-969 C1030												
9	C1023 C1025									10nF	05	041	0220
10	C1031-1032									22nF	05	041	0230
11	C109									0.2pF	05	051	0100
12	C284									0.5pF	05	051	0105
13	C792									1.5pF	05	051	0115
14	C786									1.8pF	05	051	0120
15	C9 C13 C23-24 C32 C43 C74 C95 C133 C186 C197 C214 C219 C261									100pF	05	051	0255
	C280 C323 C329 C345 C374 C379 C395-397 C403-405 C411 C449												
	C451 C455 C486 C503 C517 C528 C536 C638 C666 C691 C699 C715												
	C766 C779 C788 C834 C854-856 C862-864 C871-873 C883 C888												
	C904 C928 C933 C949 C962 C970-972 C982 C992 C1006 C1022												
	C1024												
16	C424 C426 C430 C432 C434 C491-493 C734-738 C742-748									10nF	05	041	0220
	C751-758 C805 C812 C1015 C1018												
17	C114 C173 C522 C976 C986 C1000									15pF	05	041	0080
18	C2 C77-78 C116 C149 C177 C189 C196 C285 C526-527 C705-706									1nF	05	041	0185
	C709-710 C980-981 C990-991 C1004-1005												
19	C796									2.2pF	05	051	0125
20	C40 C515 C534 C795									2.7pF	05	051	0130
21	C132 C174 C523 C977 C987 C1001									22pF	05	051	0195
22	C80 C521 C632 C802									4.7pF	05	051	0145
23	C8 C75-76 C101-102 C169 C175 C241 C243 C267 C276-277 C326									47pF	05	051	0235
	C382 C412-413 C524 C687 C689 C695 C697 C813 C963-964 C978												
	C988 C1002												
24	C22 C29 C159 C164 C184 C208 C217 C321 C327 C372 C377 C636									5.6pF	05	051	0155
	C664 C881 C886 C926 C931												
25	C453 C484									8.2pF	05	051	0165
26	C5 C34 C91 C179 C199-200 C242 C270 C514 C530 C533 C688 C696									TBD			
	C704 C708 C996 C1007 C1011												
27	C289 C292 C296 C445 C448									100nF	05	041	0275
28	C25 C33 C48 C61 C63 C73 C97 C198 C222-225 C227-231 C262-263									10nF	05	041	0220
	C281 C306-307 C312-313 C335-336 C341-342 C363-364 C369-370												
	C386 C417 C421 C428 C433 C507 C511 C529 C572 C574 C578 C580												
	C582 C584 C586-588 C592 C659 C692 C700 C771 C826 C895-896												
	C901-902 C940-941 C946-947 C983 C993 C1008												
29	C44 C117 C134 C162 C167 C187 C215 C220 C324 C330 C375 C380									1nF	05	041	0185
	C456 C487 C518 C539 C639 C667 C784 C789 C884 C889 C929 C934												
30	C1									1uF	05	041	0285
31	C62									6.8nF	05	041	0210
32	C30 C501									0.5pF	05	051	0105
33	C500									0.8pF	05	051	0108
34	C12									TBD			
35	C290-291 C297-298									180pF	05	041	0145
36	C37 C46 C237 C440									0.8pF	05	051	0108
37	C35									1.5pF	05	051	0115
38	C106 C124									100nF	05	041	0275
39	C4 C18 C39 C53-55 C119 C122 C135 C143-144 C158 C170 C183									100pF	05	041	0130
	C190 C194-195 C203 C209-210 C314 C316 C347 C351-352 C354												
	C538 C541-543 C549 C555 C641 C643 C649-652 C669 C671												
	C677-680 C903 C915-916 C918-921 C948												
40	C127									10nF	05	041	0220
41	C10 C20 C27 C56 C84-85 C87 C103-104 C108 C120 C136 C145									1nF	05	041	0185
	C171 C180 C191 C204 C211 C287 C294 C301 C317 C348 C355 C387												
	C389 C391 C398-399 C406-407 C414-415 C431 C446 C497 C504												
	C537 C544 C550 C556-557 C564-565 C567 C575 C633 C642 C653												
	C655 C670 C681 C683 C716 C749 C759 C764 C768 C780 C823 C835												
	C857-858 C865-866 C874-875 C907 C917 C922 C952 C965-966												
	C973-974 C1019												
42	C438									1pF	05	051	0110
43	C560									2.2nF	05	041	0200
44	C3 C6 C47 C121 C137 C172 C192 C212 C254 C349 C450 C452 C458									22pF	05	051	0195
	C465-466 C470-483 C644 C672 C909-913 C954-958												
45	C559									4.7pF	05	051	0145
46	C15 C21 C82 C123 C161 C166 C178 C193 C252-253 C255 C259									47pF	05	051	0235
	C300 C315 C343 C346 C353 C371 C546-548 C551-552 C554												
47	C16-17 C36 C107 C234-236 C238 C437 C439 C443 C800									TBD			
48	C566 C569									22pF	05	051	0195
49	C19									TBD			
50	C28 C111 C152 C226 C283 C418-420 C506 C583 C585 C589-591									1uF	05	041	0285
	C593 C635 C733 C740 C750 C760 C770 C806-807 C814 C825												
	C1016-1017 C1020												
51	C463									0.3pF	05	051	0103
52	C606 C609 C611									0.5pF	05	051	0105
53	C462 C464 C605 C625									0.8pF	05	051	0108
54	C110									1.5pF	05	051	0115
55	C331 C337 C359 C365 C610 C624									1.8pF	05	051	0120
56	C333 C339 C361 C367 C629 C821 C850									10pF	05	051	0170
57	C628 C820 C849									12pF	05	051	0180
58	C622 C630 C817 C822 C846 C851									15pF	05	051	0185
59	C99									1pF	05	051	0110
60	C286 C798 C840									2.2pF	05	051	0125
61	C429 C614 C663 C703 C732 C741 C775-776 C830-831									22pF	05	051	0195
62	C626									3.3pF	05	051	0135
63	C627 C819 C848									3.9pF	05	051	0140
64	C239 C308 C891 C897 C936 C942									4.7pF	05	051	0145
65	C304 C310 C893 C899 C938 C944									5.6pF	05	051	0155
66	C713 C761 C777 C832									6.8pF	05	051	0160
67	C334 C340 C362 C368									8.2pF	05	051	0165
68	C427 C714 C762 C778 C833									820pF	05	050	0205
69	C305 C311 C436 C494-495 C577 C581 C600-604 C616-620 C799									TBD			
	C803-804 C841-843 C868 C876 C878 C894 C900 C914 C939 C945												
	C959												
70	C64									22nF	05	041	0230
71	C38 C467-469 C645-648 C673-676									22pF	05	051	0235

Distinta-compo.txt			
72	C60	330pF	05 041 0160
73	C65	TBD	
74	C573	33nF	05 041 0240
75	C271	470pF	05 041 0170
76	C246 C712	0.5pF	05 051 0105
77	C303 C309 C383-384 C892 C898 C905-906 C937 C943 C950-951	18pF	05 041 0085
78	C181 C809 C999 C1014 C1036	1pF	05 051 0110
79	C265 C299 C694 C702	2.7pF	05 051 0130
80	C998 C1013 C1035	4.7pF	05 051 0145
81	C202 C513 C532	6.8pF	05 051 0160
82	C332 C338 C360 C366	8.2pF	05 051 0165
83	C153-156 C176 C182 C233 C240 C256 C278-279 C302 C520 C525 C631 C690 C698 C711 C801 C979 C985 C989 C995 C997 C1003 C1010 C1012 C1034	TBD	
84	C81 C435 C595 C597	10uF	05 040 0380
85	C45 C67-68 C88 C96 C105 C118 C157 C163 C168 C188 C216 C221 C288 C325 C344 C376 C381 C385 C388 C390 C392 C400 C408 C416 C457 C488 C505 C519 C540 C558 C568 C570 C576 C634 C640 C656 C668 C684 C769 C785 C790 C824 C859 C867 C877 C885 C890 C908 C930 C935 C953 C967 C975	1uF	05 040 0375
86	C273	330nF	05 040 0335
87	C268 C815	10uF	05 040 0380
88	C26 C293 C295 C447	10uF	05 040 0380
89	C59	470nF	05 040 0370
90	C422 C508 C660 C772 C827	1uF	05 040 0240
91	C49-52	4.7uF 50V 1206	05 040 0410
92	C146 C782 C793 C837	1uF 50V 1206	05 040 0415
93	C571	4.7uF 50V 1206	05 040 0410
94	C83 C201 C264 C282 C512 C531 C693 C701 C984 C994 C1009	10uF 25V 1210	05 040 0390
95	C579 C607-608 C612-613 C808 C844	1uF 100V AVX	05 040 0345
96	C131 C138 C140-141 C147 C1021	4.7uF	05 040 0290
97	C129-130 C247-251 C423 C509 C562 C661 C773 C828	22uF	05 040 0395
98	C425 C563 C662 C774 C829	47uF	05 040 0420
99	C69-71 C139	22uF	05 040 0395
100	C274	100uF	05 075 0525
101	C460 C767 C783 C794 C838	100uF	05 075 0455
102	C66	150uF	05 075 0530
103	FIL4 FIL6-7 FIL11-12 FIL14	0967DP18A1795	05 145 0460
104	IC24 IC48 IC53 IC57 IC61 IC67-68 IC83 IC87 IC90 IC111 IC117 IC120 IC124 IC131 IC137 IC4 IC25-26 IC28-30 IC92-98 IC145-146 IC148-149 IC7 IC12 IC23 IC73-74 IC125-127 IC139-140 IC99 IC104-105 IC109 IC123 IC8 IC3 IC6 IC9-11 IC14-15 IC18-21 IC80-82 IC84-86 IC110 IC112 IC116 IC118 IC128 IC132 IC134 IC138 IC2 IC31 IC107-108	AD5320BRMZ	10 011 0140
105	IC4 IC25-26 IC28-30 IC92-98 IC145-146 IC148-149	AD8202YRZ	10 011 0120
106	IC7 IC12 IC23 IC73-74 IC125-127 IC139-140	AD8362ARUZ	10 011 0130
107	IC99 IC104-105 IC109 IC123	AD8613AKSZ-R2	10 011 0370
108	IC8	AD8613AKSZ-R2	10 011 0370
109	IC3 IC6 IC9-11 IC14-15 IC18-21 IC80-82 IC84-86 IC110 IC112 IC116 IC118 IC128 IC132 IC134 IC138	AD8641AKSZ-R2	10 011 0225
110	IC2 IC31 IC107-108	ADG708BRUZ	10 011 0155
111	IC77	ADM3222ARUZ	10 011 0291
112	IC49-51	AG203-63G	10 005 0515
113	IC34	AH102A-G	10 005 0501
114	IC13 IC43 IC78 IC141-143	AH116-S8G	10 005 0625
115	IC65-66 IC113 IC119	AH212-S8G	10 005 0620
116	IC1	ATMEGA128L-8AU	10 011 0265
117	FIL13	DR6J1747...	05 145 0390
118	FIL9	DR6J1960...	05 145 0385
119	IC33	A30	
120	IC47	EPM745	05 128 0245
121	CP20-22	FU-450SDF-L4M70B	05 128 0405
122	CP10-11	GSC301-10M0900	05 010 0625
123	FIL16-18	GSC310-10M1900	05 010 0585
124	IC22	HMD845H	05 145 0455
125	IC27	LM2663M	10 011 0375
126	IC36-37 IC39-41 IC45-46 IC54-55 IC58-59 IC62-63 IC75-76 IC79 IC100 IC114 IC121-122 IC129-130 IC135-136 IC89 IC91	LM50CIM3X MGA-53543	10 005 0395 10 005 0650
127	IC88	NC7SZ125M5X	10 011 0380
128	IC5 IC35 IC38 IC42 IC44 IC52 IC56 IC60 IC102 IC115 IC133	NRF24L01	10 011 0385
129	IC69	PE4302-51	10 011 0145
130	CP5-8	TCP-2-25+	05 010 0510
131	CP3-4 CP14 CP17-19	XC01900E-03	05 010 0475
132	CP2	XC0900E-03	05 055 0760
133	J6	XC2500P-20S	05 010 0620
134	J2-3 J7-9 J11 J13 J19 J22-27 J32-34 J39-41	90814-0006	05 095 2030
135	D5	RL13 424 000	05 110 0185
136	D19 D22-24	10M040N	10 015 0625
137	D1-2 D4 D6-12 D20-21 D26-33	BAW56	10 015 0635
138	D25 D34	HSMP-3814	10 015 0730
139	FIL1 FIL3 FIL5 FIL15	SSC54	10 015 0955
140	L20 L25 L29 L47 L52 L55 L116 L139 L149 L167 L170 L183 L186	NFE31PT222Z1E9	05 090 0070
141	L30 L159	12nH	05 176 0910
142	L23 L26 L41-43 L67 L80-82 L118-126 L141-143 L151-155 L164 L178-180	2.7nH	05 176 0925
143	L162-163	22nH	05 176 0820
144	L33 L44 L58 L71 L98 L107 L156	3.3nH	05 176 0810
145	L48 L117 L200	3.9nH	05 176 0835
146	L68 L89	5.6nH	05 176 0850
147	L6-7 L22 L27 L32 L35 L39 L46 L50 L53 L60 L70 L73 L114 L137	6.8nH	05 176 0800
148	L147 L158 L161 L165 L168 L181 L184	TBD	
149	L59 L136	12nH	05 176 0910
150	L109-111	2.2nH	05 176 0920
151	L196 L198 L206	2.7nH	05 176 0925
152	L38 L49 L91 L194-195 L197	33nH	05 176 0875
153	L10 L16 L144-145	4.7nH	05 176 0830
154	L135	6.8nH	05 176 0800
155	L57	8.2nH	05 176 0915
156	L96-97	2.2nH	05 176 0920
157	L133	2.7nH	05 176 0925
158	L129	3.3nH	05 176 0810
159	L127	3.9nH	05 176 0835
160	L74-75 L77-78 L83-84 L86-87	4.7nH	05 176 0830
161	L63 L65 L76 L79 L85 L88 L172 L175 L188 L191	5.6nH	05 176 0850
162	L61 L66 L173 L176 L189 L192	8.2nH	05 176 0915
163	L62 L64 L171 L174 L187 L190	TBD	
164	L24 L31 L34 L45 L69 L72 L90 L99 L108 L157 L160	12nH	05 176 0910
165	L204-205	2.7nH	05 176 0925
166	L2 L14 L17 L19 L21 L28 L40 L51 L54 L115 L138 L148 L166 L169 L182 L185	47nH	05 176 0805
167	L128	8.2nH	05 176 0915
168	L94	1.6nH	05 176 0825
169	L100-106 L140 L150 L177 L193	10nH	05 176 0815
170	L92-93 L95	2.2nH	05 176 0920
171	L134	2.7nH	05 176 0925
172	L5	4.7nH	05 176 0830

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Distinta-compo.txt			
173	L4 L13 L36-37	1000nH	05 175 1235
174	L112	33uH	05 176 1025
175	L9	33uH	05 176 0960
176	L18 L130-132 L146	4221-4KTR	05 175 1620
177	L8 L11-12	10uH	05 176 1015
178	LED1-7	RED / GREEN	10 015 0940
179	OP1	SFH6916	10 015 0685
180	X2	16 MHZ	05 200 0230
181	XTAL1	8 MHZ	05 200 0245
182	R169 R216-217	0.22R	05 189 0002
183	R81 R138 R142-143 R164 R167-168 R178 R200-201 R237 R260	0R	05 189 0460
	R302 R336 R343 R350 R398 R407 R409 R413 R421-425 R428-429		
	R431-434 R446 R454-455 R474 R480 R487-488 R490 R492-494		
	R501 R503 R505-506 R515 R531 R547 R626 R636-638 R640 R658		
	R665 R676 R680 R685 R692 R696 R701 R715 R739 R753 R755 R760		
	R762 R776-777 R803-804 R812-813 R820 R864 R900 R907 R927		
	R929 R934-935 R940 R942 R944-945 R952 R954 R956-957		
184	R49 R63 R195-196 R211 R359 R367 R369 R377 R389 R562 R565	100K	05 189 0305
	R568 R571 R595 R619 R714 R967 R975		
185	R28-29 R48 R118 R123 R162 R179 R182-184 R332 R335 R339 R342	100R	05 189 0125
	R346 R349 R358 R366 R368 R376 R401 R404 R448 R459 R461-463		
	R466 R468-469 R478 R499 R618 R709 R721 R788 R791 R793-795		
	R798 R800-801 R805 R808 R810 R814 R896 R899 R903 R906 R914		
	R921 R946		
186	R3 R12-13 R19-20 R41 R50-51 R54 R66-68 R72 R74 R76 R78 R80	10K	05 189 0245
	R82 R84-86 R89 R96 R110-116 R121-122 R130-136 R146-152 R156		
	R185 R190 R205-208 R241 R246 R250-252 R264 R277 R282		
	R288-294 R306 R312 R317 R360 R370 R378 R382 R445 R452 R473		
	R485-486 R519 R535 R551 R556-559 R573 R576 R580 R597 R602		
	R606 R610-611 R667-673 R684 R693-694 R727-733 R743 R778-779		
	R824 R837 R842 R852-858 R868 R881 R886 R969 R977 R982 R986		
	R47 R616 R622 R766 R784		
187	R15 R17 R703	10R	05 189 0065
188	R8 R627 R631	120R	05 189 0130
189	R443	12K	05 189 0250
190	R959	12R	05 189 0070
191	R163	13K	05 189 0251
192	R105 R125 R222 R235 R659-660	150R	05 189 0135
193	R88	15R	05 189 0075
194	R52 R71 R73 R172-173 R220 R227 R447 R662-663 R699-700	180K	05 189 0320
195	R832-833 R876-877	180R	05 189 0140
	R43 R56 R402 R405		
196	R100 R273 R436 R910 R916 R936	18K	05 189 0260
197	R4 R27 R61-62 R70 R91 R119 R141 R157 R160 R170 R177 R259	18R	05 189 0080
198	R265 R267-268 R301 R307 R309-310 R333-334 R340-341 R347-348	1K	05 189 0185
	R361 R371 R379 R383 R457-458 R464-465 R514 R520 R522-523		
	R530 R536 R538-539 R546 R552 R554-555 R574 R577 R581 R598		
	R603 R607 R641 R643 R645 R647 R679 R686 R688-689 R707-708		
	R710 R738 R744 R746-747 R789-790 R796-797 R806-807 R819		
	R825 R827-828 R863 R869 R871-872 R897-898 R904-905 R970		
	R978 R983 R987		
199	R46 R188	1K2	05 189 0190
200	R243 R248 R279 R284 R314 R319 R839 R844 R883 R888	1K3	05 189 0191
201	R7	1K5	05 189 0195
202	R233 R960	1K8	05 189 0198
203	R34-35 R95	1M	05 189 0365
204	R191 R629-630 R633	1R	05 189 0005
205	R408 R412 R754 R761	1uF	05 051 0100
206	R623-625 R774 R786	2.7K	05 189 0210
207	R186-187 R362-363 R372-373 R380-381 R384-385 R575 R578-579	2.2K	05 189 0205
	R582-583 R592 R599-600 R604-605 R608-609 R971-972 R979-980		
	R984-985 R988-989		
208	R416	2.7K	05 189 0210
209	R450	220K	05 189 0325
210	R328-329 R705	220R	05 189 0145
211	R10 R53 R55 R64-65 R77 R90 R98 R120 R197 R212-213 R230-232	22K	05 189 0265
	R353-356		
212	R137 R327 R479 R500 R915 R922 R947	22R	05 189 0085
213	R101-102 R139-140 R257-258 R274-275 R299-300 R435 R437	270R	05 189 0150
	R512-513 R528-529 R544-545 R677-678 R704 R711-713 R717 R719		
	R736-737 R818 R861-862 R911-912 R917 R919 R937-938		
214	R189	27K	05 189 0270
215	R39 R171 R219 R226 R720 R831 R875	27R	05 189 0090
216	R628 R632	2K	05 189 0202
217	R198 R482 R586 R614 R750 R782	2K2	05 189 0205
218	R22-23 R75 R83 R97 R99 R103 R108 R128 R153-154 R158	2R2	05 189 0023
	R174-175 R269 R271 R323 R325 R444 R495-496 R507 R639 R664		
	R666 R725-726 R767 R769 R829-830 R834-835 R873-874 R878-879		
219	R25 R481 R587 R615 R765 R783	3.3R	05 189 0035
220	R242 R247 R278 R283 R313 R318 R838 R843 R882 R887	300R	05 189 0152
221	R126	330R	05 189 0155
222	R1 R36 R38 R106-107 R127 R192 R194 R210 R214 R330-331 R561	330R	05 189 0155
	R564 R567 R570 R594 R848-849 R892-893 R966 R974		
223	R69 R661 R698	33R	05 189 0095
224	R441-442 R653-656	390R	05 189 0160
225	R94 R124 R255-256 R297-298 R472 R510-511 R526-527 R542-543	3K3	05 189 0215
	R674-675 R716 R734-735 R859-860		
226	R6	430R	05 189 0162
227	R2 R161 R456	470R	05 189 0165
228	R202 R245 R276 R281 R311 R316 R836 R841 R880 R885	47R	05 189 0105
229	R21 R58 R176 R193 R295-296 R364 R374 R390 R451 R475 R584	4K7	05 189 0225
	R588-591 R593 R601 R612 R621 R642 R644 R646 R648-652 R695		
	R780 R958 R964-965 R973 R981		
230	R5 R14 R399	4R7	05 189 0045
231	R718	51K	05 189 0287
232	R18 R24 R117 R199 R203-204 R215 R218 R225 R238 R240	51R	05 189 0370
	R286-287 R321-322 R470-471 R477 R498 R802 R811 R815		
	R846-847 R890-891 R913 R918 R920 R923 R939 R948		
233	R11 R26 R722 R724	560R	05 189 0170
234	R16 R40	56R	05 189 0110
235	R453	5R6	05 189 0050
236	R393-394 R396-397 R925-926 R932-933 R950-951	680R	05 189 0175
237	R449 R460 R467 R792 R799 R809	68R	05 189 0115
238	R145 R155 R262-263 R304-305 R517-518 R533-534 R549-550	6K8	05 189 0235
	R682-683 R741-742 R822-823 R866-867		
239	R392 R395 R924 R931 R949	6R8	05 189 0055
240	R410 R414 R756 R763	75R	05 189 0117
241	R476 R585 R613 R697 R781	820R	05 189 0180
242	R42	8K2	05 189 0240
243	R723	8R2	05 189 0060
244	R221 R228	91R	05 189 0122
245	R44-45 R57 R79 R104 R109 R129 R144 R159 R165-166 R209	TBD	
	R223-224 R229 R236 R261 R266 R270 R272 R303 R308 R324 R326		
	R337-338 R344-345 R351-352 R400 R403 R406 R411 R415		

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	R417-420 R426-427 R430 R439-440 R483-484 R489 R491 R497		
	R502 R504 R516 R521 R532 R537 R548 R553 R617 R634-635 R657		
	R681 R687 R740 R745 R751-752 R757-759 R764 R768 R770-772		
	R775 R787 R821 R826 R865 R870 R901-902 R908-909 R928 R930		
	R941 R943 R953 R955		
246	R92-93 R253-254 R508-509 R524-525 R540-541 R690-691 R702	390R	05 189 0160
	R706 R748-749 R850-851 R894-895		
247	R30-31 R569 R572 R596 R620 R968 R976	0R1	05 187 0605
248	R59 R386-388 R773 R785	10R	05 187 0065
249	R9 R87	150R	05 187 0135
250	R234 R239 R438	270R	05 187 0150
251	R60	27R	05 187 0090
252	R244 R249 R280 R285 R315 R320 R840 R845 R884 R889	33R	05 187 0095
253	R32-33 R180-181	0.04R	05 187 0685
254	RL1-4	IM01GR	05 160 0645
255	IC32	LM78L15ACM	10 011 0390
256	IC71	LM1117IMPX-3.3	10 011 0330
257	IC70	LM25005MH	10 011 0295
258	IC17	MIC5207YM5	10 011 0285
259	JP1-4	TBD	
260	JP5-8	JUMPER 3VIE A PASSO 2x0805	
261	TR13 TR15-20 TR58 TR60-61 TR63	ATF-54143	10 020 0860
262	TR1-2 TR4-6 TR8 TR10 TR12 TR21-22 TR24 TR26 TR30-32 TR34	BC817-40	10 020 0880
	TR36 TR46 TR50-51 TR59 TR62 TR64-66 TR73 TR75		
263	TR41-44	BCX19	10 020 0570
264	TR3	BFG540/X	10 020 0670
265	TR7 TR9 TR11 TR14 TR23 TR29 TR37 TR70-72 TR74	IRLML6402	10 021 0105
266	TR25 TR28 TR35 TR40 TR45 TR48-49 TR52 TR54-55 TR57	UMTIN	10 020 0885
267	TR38-39 TR67-69	ZXMP4A16G	10 021 0090
268	D3 D16-18	BZX384-C3v9	10 015 0970
269	D14	LM4050DIM3-2.5	10 011 0335
270	D15	LM4050BIM3-2.5	10 011 0335
271	J1	3 POLI	05 095 2272
272	J20	vaschetta 9PF	05 095 2420
273	J18	2 POLI	05 095 1885
274	J30-31	8 POLI	05 095 2390
275	P15-30		
276	/CSN 9V-RF 9V-RF-NOISE CE IRQ MISO MOSI SCK TP1-27 TP30-69		
	TP71-141		
277	VI11-15 VI20 VI39-70 VI85 VI95-97 VI100-115 VI120-130	M2	
	VI154-162 VI170 VI179-182 VI199-212		
278	VI1-10 VI16-19 VI27-38 VI71-84 VI86-94 VI98-99 VI116-119	M3	
	VI131-151 VI153 VI168-169 VI171-178 VI183-198		
279	VI21-26		
280	VI152 VI163-167	M4_BRUG	
281	D13		
282	C148 C510		
283	C1026-1029		
284	IC106	LC4128V	10 011 0455
285	C272 C623 C797 C818 C839 C847	Trimmer cap 5pF	05 060 0115
286	C496 C621	TBD	
287	FIL8	DRD5T742... DL	05 145 0715
288	FIL19	DR5EF707... UL	05 145 0720
289	FID1-6	FIDUCIAL	
290	F1	7A	
291	CIR5	Circolatore 947MHz	05 055 0850
292	CIR4	Circolatore 836MHz	05 055 0945
293	CIR1	c1 vuole il 742MHz	05 055 0910
294	CIR2	Circolatore 1960MHz	05 055 0885
295	CIR3	Circolatore 2140MHz	05 055 0860
296	IC103	LM3722	10 011 0460
297	IC64	LM5642	10 011 0535
298	TR27	MRF6S18060N	10 021 0125
299	TR33	MRF6S18060NR1	10 021 0125
300	TR47 TR53 TR56	MRFE6S9060NR1	10 021 0110
301	R37 R357 R365 R375 R391 R560 R563 R566 R991-992	0R1	05 187 0675
302	IC16 IC101	REG104A-A	10 010 1120
303	J28-29	Teko	
304	J5 J14-17 J21 J35-38	SMA	05 110 0245
305	L3 L15	10UH 6A	05 176 1050
306	TR76-79	SI7460DP-T1-E3	10 021 0010
307	L1	SMP6530	Non trovato
308	P2-14 P31-37		
309	J4 J12	Teko 05 095 2240	05 095 2240
310	CP1 CP12 CP16	XC0900A-20	05 010 0245
311	CP13	XC1900A-20	05 010 0515
312	CP15	XC2100A-20	05 010 0545



Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 38.00 (dBm)

Maximum peak output power at antenna input terminal: 6400 (mW)

Antenna gain(maximum): 16 (dBi)

Maximum antenna gain: 39.81071706 (numeric)

Time Averaging: 100 (%)

Prediction distance: 145 (cm)

Prediction frequency: 2000 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 1.000 (mW/cm²)

Power density at prediction frequency: 0.964349 (mW/cm²)

Margin of compliance: -0.2 (dB)

This equates to: 9.643487136 W/m²



Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 38.00 (dBm)

Maximum peak output power at antenna input terminal: 6400 (mW)

Antenna gain(maximum): 16 (dBi)

Maximum antenna gain: 39.81071706 (numeric)

Time Averaging: 100 (%)

Prediction distance: 190 (cm)

Prediction frequency: 865 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 0.577 (mW/cm²)

Power density at prediction frequency: 0.561646 (mW/cm²)

Margin of compliance: -0.1 (dB)

This equates to: 5.616463076 W/m²



Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 38.00 (dBm)

Maximum peak output power at antenna input terminal: 6400 (mW)

Antenna gain(maximum): 4.5 (dBi)

Maximum antenna gain: 2.818382931 (numeric)

Time Averaging: 100 (%)

Prediction distance: 50 (cm)

Prediction frequency: 865 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 0.577 (mW/cm²)

Power density at prediction frequency: 0.574156 (mW/cm²)

Margin of compliance: 0.0 (dB)

This equates to: 5.74156256 W/m²



Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 38.00 (dBm)

Maximum peak output power at antenna input terminal: 6400 (mW)

Antenna gain(maximum): 6.5 (dBi)

Maximum antenna gain: 4.466835922 (numeric)

Time Averaging: 100 (%)

Prediction distance: 50 (cm)

Prediction frequency: 2000 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 1.000 (mW/cm²)

Power density at prediction frequency: 0.909976 (mW/cm²)

Margin of compliance: -0.4 (dB)

This equates to: 9.099763416 W/m²

SIRIUS: Teko Telecom Modular Coverage and Capacity System



TECHNICAL HANDBOOK

☐ Doc ID Number 91 080 0781 – Rel. 02

english

SIRIUS: Teko Telecom Modular Coverage and Capacity System



BOLOGNA, 11/10/2010

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Attached Documents**Safety Rules****Standards**

Initial Notes

Declaration of Conformity (*)

According to Directive 1999/5/EC (R&TTE)

We TEKOTELECOM hereby declare that the products described in this technical handbook are manufactured by TEKOTELECOM S.p.A. Via Meucci, 24/a 40024 Castel S. Pietro Terme (Bologna) – ITALY. All the above cited products are compliant with the essential requirements of article 3 and other relevant provisions of the Radio & Telecommunications Terminal Equipment Directive, n.1999/5/EC, when used for their intended purpose: improving coverage of mobile communication networks.

Castel S. Pietro Terme (Bologna) – ITALY

Legal representative

Teko Telecom S.p.A.

a Socio Unico

(*) A signed copy of the conformity declaration is available upon request. Please get in touch with our after sale service, filling in the form on line at the following Internet address: www.tekotelecom.it

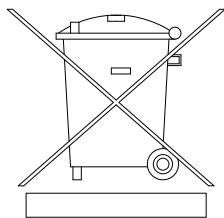
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It's under user's own responsibility to verify to be compliant to the National provisions or authorisations required.

For further information refer to: http://ec.europa.eu/enterprise/sectors/rtte/index_en.htm

EU directive 2002/96/EC – WEEE (Waste Electrical and Electronic Equipment)

This product complies with the EU directive 2002/96/EC – WEEE (Waste Electrical and Electronic Equipment)



The symbol of the crossed container marked on the equipment shows that the product, at the end of its useful life, must be collected separately from other refuse. Therefore the user must deliver the equipment that has reached the end of its life to the special differentiated electronic and electrotechnical refuse collection centres, for subsequent dispatch of the discarded equipment for recycling, treatment and environmentally compatible disposal, thus contributing in preventing possible negative effects on the environment and on health and favouring the recycling of the materials from which the equipment is made.

Illicit disposal of the product by the user will lead to the application of the penalties provided for by the national legislations of the various Member States on receipt of directive 2002/96/EC.

For further information, please contact our after sales department: www.tekotelecom.it

Packaging and Packaging Waste Directive 94/62/EC

The packaging of the product complies with the Directive 94/62/EC, concerning packaging and packaging waste. Environmentally harmful materials are not used for packaging.

Packaging is made from materials that can easily be recycled after use. Depending on the means of transportation, the equipment is packed in a cardboard or wooden box, protected with expanded polystyrene or barrier bags.

The packaging materials are marked according to ISO 11 469.

Please do not throw packaging materials into unsorted waste but separate them according to local regulations waste disposal options.



Operation is subject to the following conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 50 cm for Low Power family in Tri-Band system (with 8dB of maximum antenna gain for operating bands lower than 1.5GHz and 11dB for operating bands higher than 1.5GHz), at least 50 cm for Low Power family in Six-Band system (with 4.5dB of maximum antenna gain for operating bands lower than 1.5GHz and 6.5dB for operating bands higher than 1.5GHz) and at least 150 cm for Very High Power family in Tri-Band System (with 3.5dB of maximum antenna gain for operating bands lower than 1.5GHz and 6.5dB for operating bands higher than 1.5GHz) from all persons assuming no co-location or operating in conjunction with any other antenna or transmitter.

With higher maximum gain and/or co-location higher separation distance is required and shall be calculated accordingly by the installer. For Low Power family in Tri-Band system with 16dB of maximum antenna gain, the separation distance from nearby people shall be 130 cm for operating bands lower than 1.5GHz, and 90 cm for operating bands higher than 1.5GHz. For Low Power family in Six-Band system with 16dB of maximum antenna gain, the separation distance from nearby people shall be 190 cm for operating bands lower than 1.5GHz, and 145 cm for operating bands higher than 1.5GHz. For Very High Power family in Tri-Band system with 16dB of maximum antenna gain, the separation distance from nearby people shall be 630 cm for operating bands lower than 1.5GHz, and 450 cm for operating bands higher than 1.5GHz. Specifications of antennas, cables, RF components, etc will be provided only in the final installation phase, being the external antenna not provided with equipment.

Equipment will be accessible only to maintenance men, that must switch it off before any maintenance operation.

Teko Telecom Coverage and Capacity Systems Technical Handbook

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SIRIUS: Teko Telecom Modular Coverage and Capacity System



1.General Description



1. Teko Telecom Modular Coverage and Capacity System - General Description

Teko Telecom Coverage and Capacity Systems are flexible multi-band multi-operator Systems that provide a wide range of solutions to extend both indoor and outdoor cellular coverage in shadow areas -where the RF signal is not available- and to increase capacity in indoor and outdoor hot spots -where the operators need a dedicated coverage.

Modular design is a key feature of Teko Telecom Coverage and Capacity Systems: it offers flexible configuration options to build the most suitable solution for any coverage need.

SIRIUS

Stand-alone Modular Repeaters, Optical Systems as well as integrated solutions share a unique common platform: SIRIUS.

SIRIUS includes a wide range of active and passive components that can be assembled in a variety of ways in order to provide easy to set-up, maintain, and upgrade products operating in the 380 to 2700MHz frequency range.

SIRIUS components can be used in different Systems with different functionalities to meet present needs and to allow system adaptation to changing conditions, always assuring optimized performances.

Teko Telecom Master Unit is the core of SIRIUS modular design: it is a versatile modular rack-based platform that controls the whole Coverage System and, depending on its components configuration, is able to provide:

- the RF interface towards the signal source (BTS, Node B, Repeater),
- the RF interface towards Service Antennas/leaky cable,
- the optical interface towards up to 144 Remote Units.

This technical handbook describes the components of SIRIUS and how these components can be assembled to provide Optical Systems and Modular Off-air Repeaters to improve coverage in different environments.

1.1 Components

The components of SIRIUS, Teko Telecom Modular Coverage and Capacity System, can be grouped in the following categories:

1. Modules providing the RF interface towards the signal source

- **Point of Interface (POI) module:** it is the single-band/single-operator interface towards a BTS or NodeB. The Point of Interface module is connected to the signal source via coaxial cable.
- **Digital Donor Front End Module:** it is the single-band/single-operator interface towards a Donor Antenna, providing a connection to a BTS or NodeB over an air link.

2. Equipment extending coverage / distributing capacity

- **Service Front End:** it is the single-band/multi-operator interface towards a Service Antenna. It provides wireless signal to the area to be covered (Modular Repeaters). In Optical Systems the Service Front End can be used to extend coverage to the area close to the Master Unit site.
- **Remote Unit:** it is the multi-band/multi-operator equipment used in Optical Systems to distribute wireless signal throughout the area to be covered (extensive areas coverage/active DAS).

3. Modules providing the optical interface towards Remote Units

- **Fiber Optic Transmitter/Receiver Modules** are the optical interface between Master Unit and Remote Units: they provide RF-to-Optical/Optical-to-RF conversion.
- **Master and Slave Point to Point Modules** perform the RF-to-Optical/Optical-to-RF conversion required by the optical point to point link connecting RF Interface modules to distant Fiber Optic Transmitter/Receiver Modules. The optical point to point link allows a separation distance -up to 20km- between RF Interface modules and Fiber Optic Transmitter/Receiver Modules.

4. Passive Modules providing distribution and filtering

Due to the flexible configuration options of Teko Telecom Coverage and Capacity Systems, the same passive components can be used for different purposes.

- The **4-way Combiner/Splitter** can be used to manage either up to 4 RF interface modules, operating in the same band (Multi-Operator Systems) or up to 4 Fiber Optic Modules (Fiber Optic Transmitter/Receiver Modules or Master Point to Point Modules).
- The **Band Splitter/Combiner (Triplexer) with built-in 1:4 Splitter/Combiner** can be used to manage up to 3 RF interface modules or Service Front End subracks,

operating in different bands, and up to 4 Fiber Optic Modules. It can also manage up to 3 four-way splitter/combiner modules each connected to multiple RF interface modules, operating in the same band, and up to 4 Fiber Optic Modules.

5. Modules for the management of the System

- The **Supervision Module** allows the management of the whole Coverage System.
- The **Alarm Module** is an optional module that can be equipped to increase the number of supported external alarms.

6. Power Supply Modules

The Coverage and Capacity Systems can be equipped with either AC (Universal mains, 85÷264Vac, 50-60Hz) or DC (-72÷-36Vdc) Power Supply modules.

7. Subracks hosting the System modules

Both active and passive subracks are available.

- **Active subracks** are provided with a backplane that allows the management and power supply of active modules.
- **Passive subracks** are used to host passive modules that do not require power nor management to function. Passive Subracks allow a reduction in the cost of the whole system.

8. Forced-air cooling Subrack

A forced-air cooling subrack is available to ensure the air flow required for proper cabinet installed equipment operation.

Rack cabinets for hosting the System Subracks (indoor installation) and cabinets for Outdoor installation are also available.

A detailed description of each Component of Teko Telecom Modular Coverage and Capacity System is provided in the following paragraphs.

1.1.1 Modules providing the RF interface towards the signal source

- **Point Of Interface Modules**

Point of Interface modules are used in Optical Systems to interface any kind of operator signal source -pico/micro/macro BTS or NodeB: each Point of Interface module is connected to a single mobile operator/ mobile band signal source via coaxial cable.

Optical Systems can be equipped with one Point of Interface or more Point of Interface modules to make multiple configurations available: single operator (single band / multi-band) and multi-operator (single-band / multi-band).



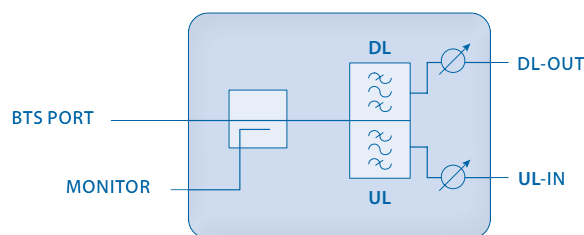
Passive Point Of Interface module (POI)
with rotary adjustable attenuators



Point Of Interface module (TAPOI) with
remote-controlled variable attenuators

Each Point of Interface module includes the duplexer, to separate/combine Downlink and Uplink paths and two variable attenuators to make both Downlink and Uplink RF levels separately adjustable.

A monitor port is available either for measurements or for external wireless modem coupling.



Point Of Interface module block diagram

Point of Interface modules with separate Downlink and Uplink ports (without built-in duplexer) are available as option.

Teko Telecom Point of Interface modules can be equipped either with manually adjustable attenuators (POI-x models) or with remote-controlled attenuators (TAPOI-x models).

POI modules

POI modules include two rotary adjustable attenuators to make Downlink and Uplink RF levels manually adjustable within a range of either 30dB, with 1dB step, or 10dB, with 1dB step (POI-A10 models).

TAPOI modules

TAPOI modules include two automated variable attenuators to adjust Downlink and Uplink RF levels via the Coverage System Supervision Module (TSPV) and Management Tools (OMT webpages, OMC software).

- POI Modules Access Points

Adjustable
attenuators

Passive POI with built-in duplexer

Adjustable
attenuators

Passive POI without built-in duplexer

Label (Connectors)	Description
DL-OUT	Downlink path RF output (SMA connector)
UL-IN	Uplink path RF input (SMA connector)
BTS PORT	RF connector (N type) towards the signal source (BTS, Node B or repeater)
MONITOR	Monitor port for measurements or for external wireless modem coupling

Label (Connectors)	Description
DL-OUT	Downlink path RF output SMA connector
UL-IN	Uplink path RF input SMA connector
BTS PORT DL	Input RF connector from the signal source - BTS, Node B or repeater (N type)
BTS PORT UL	Output RF connector to the signal source - BTS, Node B or repeater (N type)

Adjustable attenuators	Description
DL OUT	Downlink path RF level adjustable attenuator (0÷30dB or 0÷10dB - 1 dB step)
UL IN	Uplink path RF level adjustable attenuator (0÷30dB or 0÷10dB - 1 dB step)

- TAPOI Modules Access Points



TAPOI with built-in duplexer

Label (Connectors)	Description
DL OUT	Downlink path RF output (SMA connector)
UL IN	Uplink path RF input (SMA connector)
BTS PORT	RF connector (N type) towards the signal source (BTS, Node B or repeater)
MONITOR	Monitor port for measurements or for external wireless modem coupling

Label (LEDs)	Description
ON	TAPOI Module operating status green LED ON when power supply is present
ALM	TAPOI Module alarm status LED: OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

- **Teko Telecom Digital Donor Front End**

The Digital Donor Front End Module is the single-band/single-operator System RF interface towards a Donor Antenna. No physical connections are required between the DFE and the cellular network: the Donor Antenna provides the connection to a BTS or NodeB over an air link.

Coverage Systems can be equipped with one or more Donor Front End modules to make multiple configurations available: single operator (single band / multi-band) and multi-operator (single-band / multi-band).



A single-band single-operator modular Off-air Repeater can be set up combining a Digital Donor Front End Module and a Service Front End (Teko Telecom single-band/multi-operator interface towards a Service Antenna). Up to 4 Donor Front End Modules can be connected to a single Service Front End to provide a single-band 4-operator modular Off-air Repeater.

Digital Donor Front End Modules can also be used to drive Optical Systems: the Digital Donor Front End Module allows Optical Systems to be driven without the need of a dedicated BTS or Node B. A donor antenna picks-up the signal and the Optical System acts as a repeater with distributed Service antennas connected to the Remote Units. Service Front End sub racks can be connected to DFE modules to provide coverage to the area next to the Master Unit site.

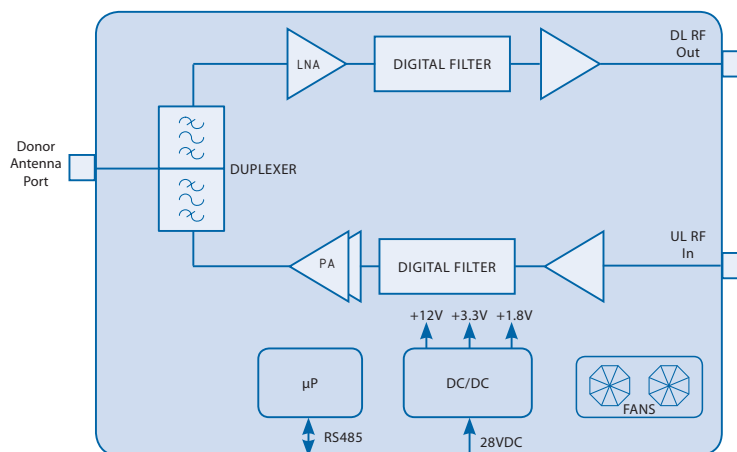
Each DFE module hosts the duplexer, to be connected to the Donor Antenna to separate/combine downlink and uplink paths.

In downlink the signal from the Donor Antenna is preamplified by a Low Noise Amplifier and converted into an IF signal by a downconverter. The selection of the band of frequencies or channels to be extended is handled by a digital filter.

The digital filter can manage 1 variable band or 2 variable sub-bands.

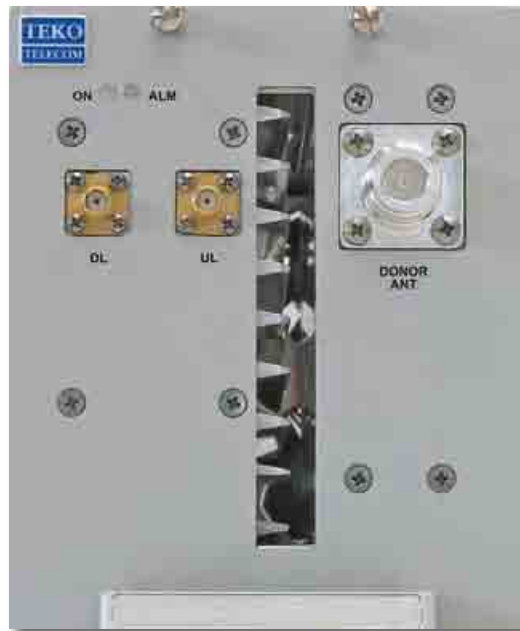
An upconverter converts the IF signal into the RF output signal.

In uplink the signal from the Service Front End Subrack or from the Optical System is converted into an IF signal by a downconverter, filtered and re-converted into an RF signal, amplified by a power amplifier and re-transmitted to the signal source.



Digital Donor Front End Module block diagram

Digital Donor Front End Module Access Points



Label (Connectors)	Description
DL	Downlink path RF output (SMA connector) to Service Front End or Fiber Optic Modules
UL	Uplink path RF input (SMA connector) from Service Front End or Fiber Optic Modules
DONOR ANT	Donor Antenna Port (N type connector)

Label (LEDs)	Description
ON	Digital Donor Front End Module operating status green LED: ON when power supply is present
ALM	Digital Donor Front End Module alarm status LED: OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

1.1.2 Equipment extending coverage / distributing capacity

- **Teko Telecom Service Front End**

Teko Telecom Service Front End Subrack is a single-band/multi operator equipment, driven by Digital Donor Front End Modules and connected to a Service Antenna to provide wireless signal to the area to be covered. The equipment is available in four different power classes: Very High, High, Medium and Low.

A single-band single-operator modular Off-air Repeater can be set-up combining a Digital Donor Front End Module and a Service Front End. Up to 4 Donor Front End Modules can be connected to a single Service Front End subrack to provide a single-band 4-operator Repeater.

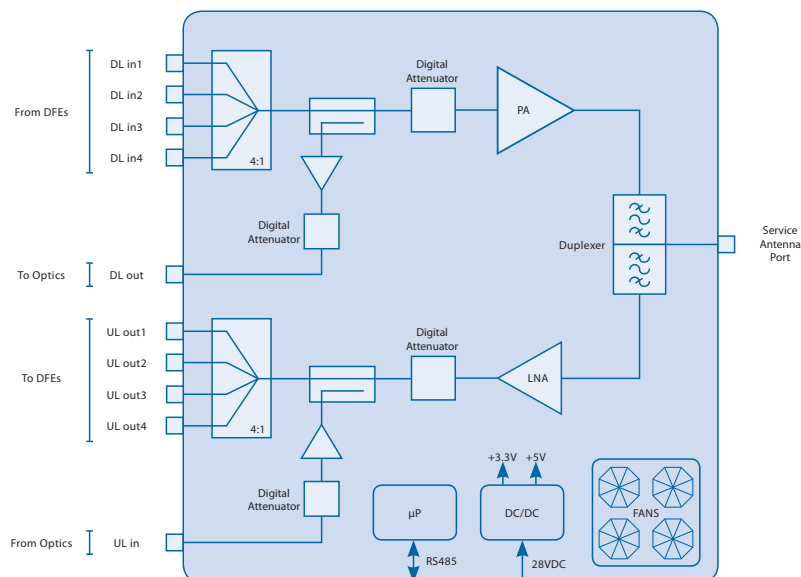
The Service Front End subrack can also be used in Optical Systems to provide coverage to the area adjoining the Master Unit site.

The SFE 19"/2U subrack hosts the duplexer, to be connected to the Service Antenna to separate/combine Downlink and Uplink paths.

In Downlink the signals from the Donor Front-End Modules are combined and amplified by a Power Amplifier.

In Uplink, the RF signal from the Service antenna is amplified by a Low Noise Amplifier (LNA) and split to feed up to 4 Donor Front-End Modules.

Auxiliary ports are available to drive an Optical System.



Service Front End Module block diagram

Service Front End Module Access Points



Label (Connectors)		Description
DL TO OPT		Downlink path RF output (SMA connector) - to Optics
UL FROM OPT		Uplink path RF input (SMA connector) - from Optics
SERVICE ANT		Service Antenna Port (N type)
DFE1	DL	Downlink path RF input (SMA connector) - from Digital Donor Front End 1
	UL	Uplink path RF output (SMA connector) - to Digital Donor Front End 1
DFE2	DL	Downlink path RF input (SMA connector) - from Digital Donor Front End 2
	UL	Uplink path RF output (SMA connector) - to Digital Donor Front End 2
DFE3	DL	Downlink path RF input (SMA connector) - from Digital Donor Front End 3
	UL	Uplink path RF output (SMA connector) - to Digital Donor Front End 3
DFE4	DL	Downlink path RF input (SMA connector) - from Digital Donor Front End 4
	UL	Uplink path RF output (SMA connector) - to Digital Donor Front End 4

Label (LEDs)	Description
LED	Service Front End subrack general operating status LED Green: no alarm Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

- **Teko Telecom Remote Units**

Remote Units are used in Optical Systems to distribute wireless signals throughout the area to be covered. They are connected to the Fiber Optic Transmitter/Receiver Modules equipped in the Master Unit.

Remote Units are equipped with the Fiber Optic Receiver and Transmitter module (for Optical to RF and RF to Optical conversion), power amplifiers and filtering.

They can be Single, Dual or Tri-band with four different RF power classes: Very High, High, Medium and Low.

Remote Units with different power classes can be driven simultaneously by the same Master Unit to distribute capacity or extend coverage into different locations at the same time.

Very High, High and Medium Power Remote Units are equipped in a weatherproof IP66 case. Low Power Remote Units are equipped in an IP32 case; a protection kit, providing IP66 protection degree, is available as option for installation in harsh environments.



Single, Dual or Tri-band Very High, High and Medium Power Remote Unit



Single, Dual or Tri-band Low Power Remote Unit

Please refer to Paragraph 1.2.2 for a detailed description of Remote Units.

1.1.3 Modules providing the optical interface towards Remote Units

- **Fiber Optic Transmitter/Receiver Modules**

Fiber Optic Transmitter/Receiver Modules are the optical interface between Master Unit and Remote Units: they provide RF-to-Optical/Optical-to-RF conversion. They are connected to Remote Units via single mode optical fibers, with Uplink and Downlink signals transmitted over the same fibre (Wavelength Division Multiplexing -WDM technology).

Different modules configurations are available: a single Fiber Optic Transmitter/Receiver Module can be equipped with 1 Optical Transmitter and 1 Optical Receiver (10dB optical link budget, up to 20km distance - 12.4 miles), or 1 Optical Transmitter split by 2 and 2 combined Optical Receivers (10dB optical link budget, up to 20km distance- 12.4 miles), or 1 Optical Transmitter split by 4 and 4 combined Optical Receivers (6dB optical link budget, up to 12km distance - 7.5 miles).

The Fiber Optic Transmitter/Receiver Module in 1:4 configuration can manage up to 4 Remote Units.

The Fiber Optic Transmitter/Receiver Module in 1:1 configuration is able to drive up to 5 cascaded Remote Units with different wavelengths in Up-link.



Fiber Optic Transmitter/Receiver Module equipped with 1 Optical Transmitter split by 4 and 4 combined Optical Receivers

The Fiber Optic Transmitter provides the RF to optical conversion (Downlink side): the module RF section covers the 380 to 2200MHz band (TTRC models) or the 380 to 2700MHz band

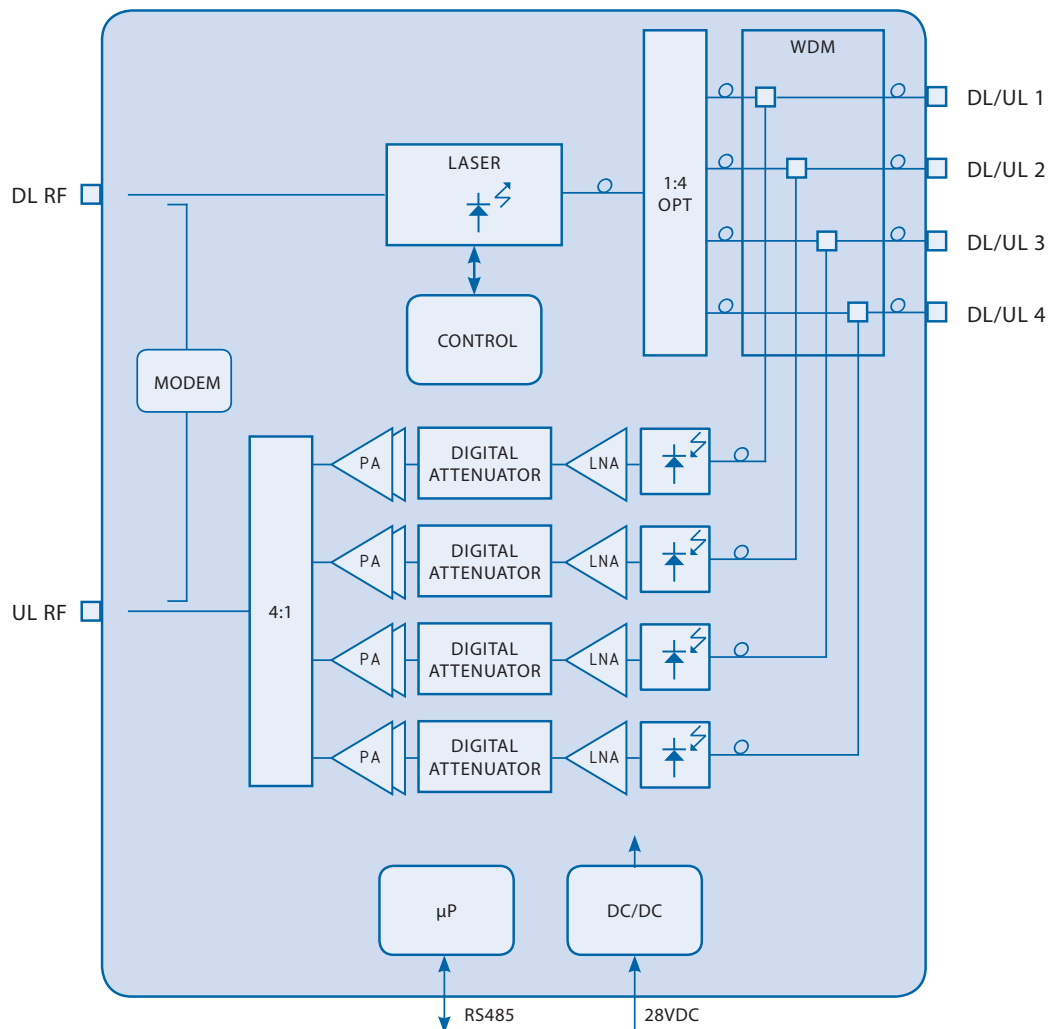
(TTRU models).

Fiber Optic Receivers convert uplink optical signals from Remote Units into RF. They operate in the third window (Optical wavelength $1490 \div 1570$ nm).

Each Fiber Optic module is controlled by a microprocessor which provides the following data to the Supervision Module:

- optical power received by each optical receiver,
- Downlink attenuator and Uplink attenuator attenuation setting ($0 \div 15$ dB),
- received optical power alarms.

An auto-levelling functionality (AGC) compensates up to 10dB optical link loss in order to guarantee constant gain over different optical budgets. This feature simplifies system installation, makes commissioning quick and easy and avoids field adjustments.



Block diagram: Fiber Optic Transmitter/Receiver Module equipped with 1 Optical Transmitter split by 4 and 4 combined Optical Receivers (WDM technology)

Fiber Optic Transmitter/Receiver Module Access Points

Fiber Optic Module equipped with 1 Transmitter
split by 4 and 4 combined Receivers - WDMFiber Optic Module equipped with 1 Transmitter
split by 4 and 4 combined Receivers

Optical Connectors	Description
DL	Fiber Optic Transmitters (1 to 4) optical output SC-APC connectors
UL	Fiber Optic Receivers (1 to 4) optical power input SC-APC connectors
RF Connectors	Description
DL RF	Fiber Optic Transmitter RF input SMA connector
UL RF	Fiber Optic Receiver RF output SMA connector
LEDs	Description
ON	Fiber Optic Module operating status green LED ON when power supply is present
ALM	Fiber Optic Module alarm status LED: OFF: regular operation; BLINKING ORANGE/ORANGE: warning/minor; BLINKING RED/RED: major/critical
DL UL	These LEDs describe the general operating status of Remote Units (1 to 4) connected to Fiber Optic Transmitters (DL) and Repeaters (UL) . Each pair of DL/UL leds takes the same color as the general operating status led of the Remote Unit connected to the relevant optical connector, except when • a Laser Fault occurs in the Fiber Optic transmitter. If this fault occurs, all DL leds turn RED and the ALM Led switches on (RED). • a Low Optical Power alarm arises in the Fiber Optic receiver. If this alarm arises, the relevant UL led turns RED and the ALM Led switches on (RED). Each pair of DL/UL LEDs can be: Green: Remote Unit status OK Blinking Orange: presence of RU active alarms with warning severity level (4) Orange: presence of RU active alarms with minor severity level (3) Blinking Red: presence of RU active alarms with major severity level (2) Red: presence of RU active alarms with critical severity level (1)

- **Master and Slave Point to Point Modules**

Master and Slave Point to Point Modules provide an optical point to point link allowing a separation distance -up to 20km- between RF interface subracks and optical subracks.

The point to point link is suitable when the signal source (BTS, Node B, Repeater) is located far from the area to be covered or when the same optical system provides coverage to several separate buildings; in these applications the point to point link allows the transmission of signals from/to a group of remote units over a single optical fibre, thus providing a significant reduction in the number of fiber optics running long distances.

The point to point link requires the RF interface subracks to be equipped with Master Point to Point modules and the remote optical subracks to be equipped with Slave Point to Point modules. The RF Interface subracks can be equipped with up to 4 Master Point to Point modules for the management of up to 4 optical subracks, installed in different remote locations.



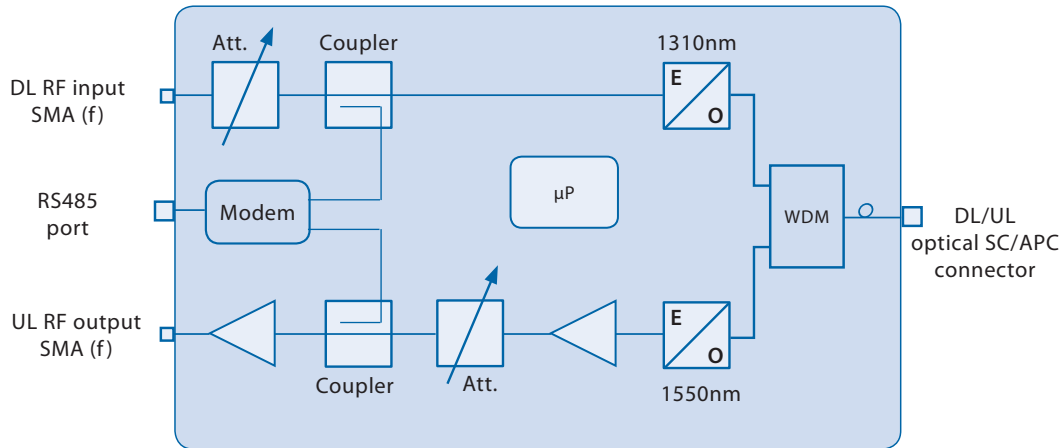
Master Point to Point Module



Slave Point to Point Module

Each Master Point to Point Module is connected to a Slave Point to Point Module, equipped in a remote optical subrack, via a single optical fibre (single-mode SMR 9/125).

Point to Point Modules (Master and Slave) perform the electrical-to-optical/optical-to-electrical conversion required for the transmission of downlink and uplink signals over the connecting optical fibre.

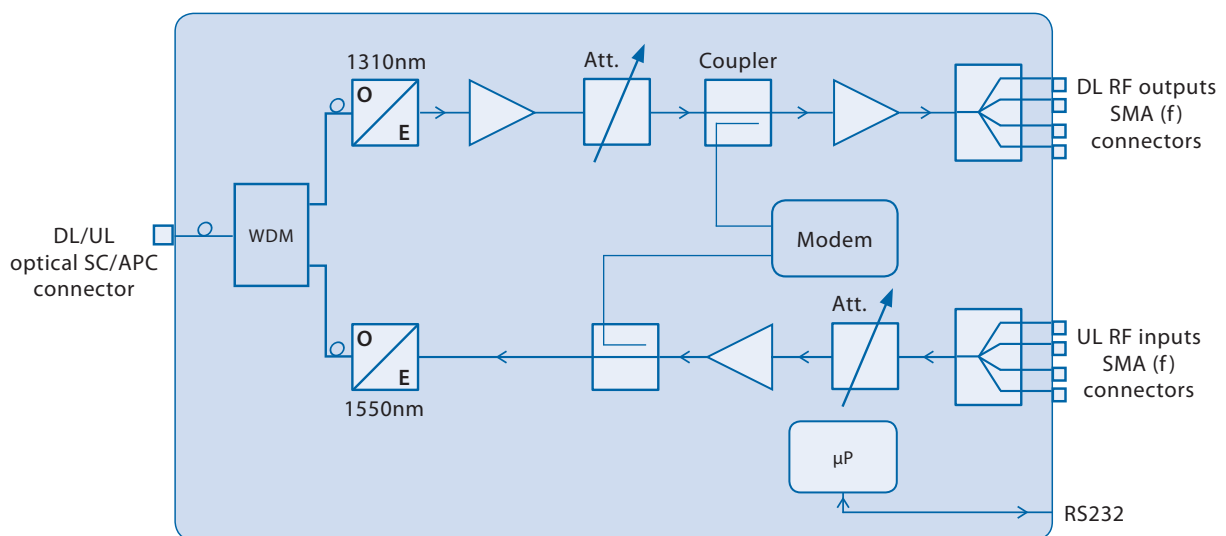


Master Point to Point Module Module block diagram

The Slave Point to Point module includes the 4-way splitter/combiner to manage up to 4 Fiber Optic Transmitter/Receiver Modules. A built-in Supervision unit controls the remote optical subrack, hosting the Slave Point to Point module, and all connected Remote Units.

The Coverage System Supervision Module communicates with the Slave Point to Point module built-in Supervision unit via the single-mode optical fiber connecting Master and Slave Point to Point modules.

An RS232 port on the Slave Point to Point Module front panel allows local communication with the built-in supervision.



Slave Point to Point Module Module block diagram

Master Point to Point Module Access Points

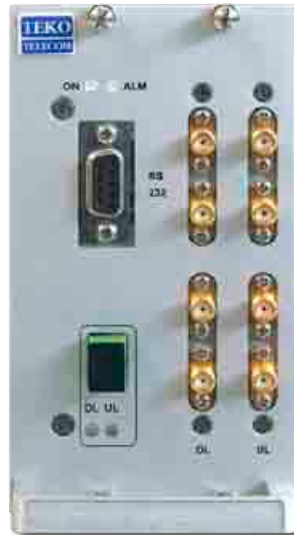


Master Point to Point Module

Label (Connectors)	Description
DL UL	Optical power input/output SC-APC connector (from/to Slave Point to Point Module)
RS485	RJ45 connector for RS485 connection to the Supervision Module
DL	RF input SMA connector (from the System RF Interface modules)
UL	RF output SMA connector (to the System RF Interface modules)

Label (LEDs)	Description
ON	Master Point to Point Module operating status green LED: ON when power supply is present
ALM	Point to Point Module alarm status LED: OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)
DL	Fiber Optic Transmitter operating status LED: BLINKING GREEN: the module is reaching its operating temperature GREEN optical output power is available ORANGE: warning: optical output power is degraded RED: Laser Fault: no optical output power
UL	Fiber Optic Receiver operating status LED: GREEN: +6dBm to -4dBm optical input power YELLOW: -4dBm to -5dBm optical input power RED: optical input power is >+6dBm or <-5dBm

Slave Point to Point Module Access Points



Slave Point to Point Module

Label (Connectors)	Description
DL UL	Optical power input/output SC-APC connector (from/to Master Point to Point Module)
RS232	9-pole D-Sub RS232 connector for connection to an external modem (Local Management)
DL	RF output SMA connectors (to Fiber Optic Modules)
UL	RF input SMA connectors (from Fiber Optic Modules)

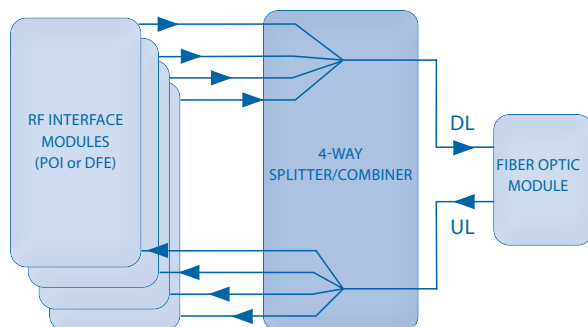
Label (LEDs)	Description
ON	Master Point to Point Module operating status green LED: ON when power supply is present
ALM	Point to Point Module alarm status LED: OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)
DL	Fiber Optic Receiver operating status LED: GREEN: +6dBm to -4dBm optical input power YELLOW: warning: -4dBm to -5dBm optical input power RED: alarm: optical input power is >+6dBm or <-5dBm
UL	Fiber Optic Transmitter operating status LED: BLINKING GREEN: the module is reaching its operating temperature GREEN optical output power is available ORANGE: warning: optical output power is degraded RED: : Laser Fault: no optical output power

1.1.4 Passive Modules providing distribution and filtering

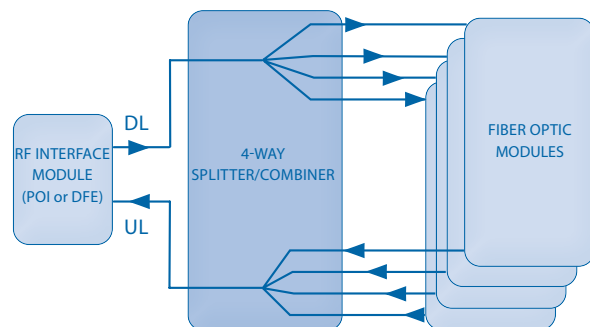
- 4-way Combiner/Splitter Module



The 4-way Combiner/Splitter can be used to manage either up to 4 RF interface modules (POI modules or DFE modules), operating in the same band (Multi-Operator Systems) or up to 4 Fiber Optic Transmitter/Receiver Modules.



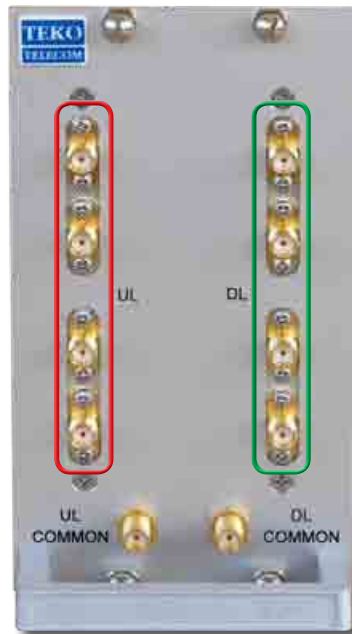
4-way combiner (DL side) / 4-way splitter (UL side) to manage up to 4 RF interface modules operating in the same band



4-way splitter (DL side) / 4-way combiner (UL side) to manage up to 4 Fiber Optic Transmitter/Receiver Modules

4-way Combiner/Splitter module block diagrams

4-way Combiner/Splitter Module Access Points



Label (Connectors)	Description			
UL	WHEN USED TO MANAGE MULTIPLE RF INTERFACE MODULES	Up-link path output SMAconnectors (to RF interface modules)	WHEN USED TO MANAGE MULTIPLE FIBER OPTIC MODULES	Up-link path input SMAconnectors (from optical sub-racks)
UL COMMON		Up-link path input SMA connector		Up-link path output SMA connector
DL		Down-link path input connectors (from RF interface modules)		Down-link path output connectors (to optical sub-racks)
DL COMMON		Down-link path output		Down-link path input

- **Triplexer (Band Splitter/Combiner) with built-in 4-way Combiner/Splitter**

The Triplexer is used in multi-band configurations to distribute signals operating in different bands.

The module also includes a 4-way Splitter/Combiner to drive up to 4 Fiber Optic Transmitter/Receiver Modules.

Several models of Triplexers, operating over different Uplink/Downlink frequency bands, are available.



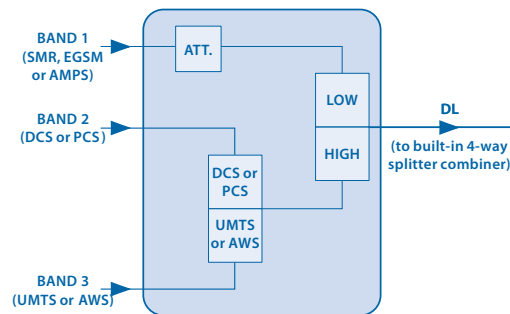
Example: EGSM, DCS, UMTS Triplexer with built-in 4-way Combiner/Splitter



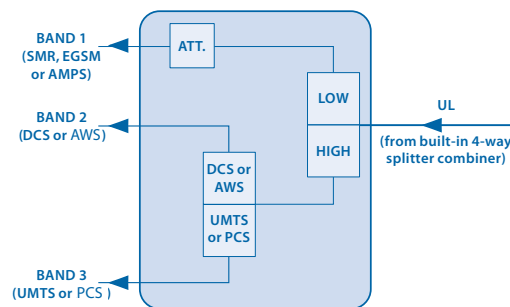
Example: AMPS, PCS, AWS Triplexer with built-in 4-way Combiner/Splitter

The triplexer can be used in Optical Systems to manage:

- up to 3 RF interface modules operating in different bands and up to 4 Fiber Optic Transmitter/Receiver Modules, or
- up to 3 Service Front End modules operating in different bands and up to 4 Fiber Optic Transmitter/Receiver Modules, or
- up to 3 four-way splitter/combiner - used to manage multiple RF interface modules (up to 4 for each band) - and up to 4 Fiber Optic Transmitter/Receiver Modules.

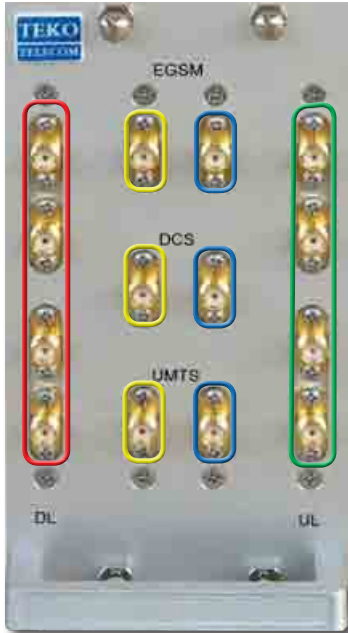


Example: EGSM, DCS, UMTS Triplexer block diagram - Downlink path

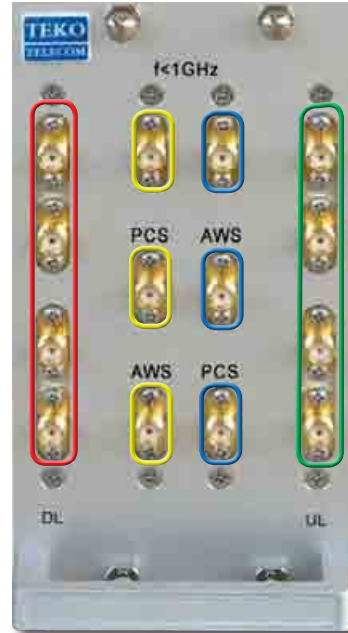


Example: Low band, PCS, AWS Triplexer block diagram - Uplink path

Triplexer Module Access Points -Example



Example: EGSM, DCS, UMTS Triplexer
with built-in 4-way Combiner/Splitter



Example: AMPS, PCS, AWS Triplexer
with built-in 4-way Combiner/Splitter

Connectors		Description
EU Bands	US Bands	
EGSM	f<1GHz	Low band (700 to 960MHz) input (down-link path)
		Low band (700 to 960MHz) output (up-link path)
DCS	PCS	DCS or PCS input (down-link path)
	AWS	DCS or AWS output (up-link path)
UMTS	AWS	UMTS or AWS input (down-link path)
	PCS	UMTS or PCS output (up-link path)

UL	WHEN USED TO MANAGE MULTIPLE FIBER OPTIC MODULES	Up-link path input connectors (from optical subrack)	WHEN USED TO MANAGE MULTIPLE FOUR-WAY COMBINER/SPLITTER MODULES	Up-link path output connectors (to 4-way combiner/splitter modules)
DL		Down-link path output connectors (to optical subrack)		Down-link path input connectors (from 4-way combiner/ splitter modules)

1.1.5 Modules for the management of the System

- **Supervision Module**

The Supervision Module (TSPV) allows the control and management of the entire Coverage and Capacity System. The Supervision Module is provided with its own TCP/IP address and with a built-in web server that allows control and management via a standard web browser. The Coverage System can be accessed either via a physical (Ethernet LAN) connection or via a modem connection.

Up to 9 Active Subracks can be monitored connecting a PC, either locally or remotely, to the Ethernet port (LAN, RJ45 connector), available on the Supervision Module front panel.



Supervision Module equipped with optional built-in wireless modem



Supervision Module with RS232 port

For remote control the System can also be accessed via optional wireless modem (integrated inside the supervision module).

When the optional built-in wireless modem is equipped an SMA input/output connector is available on the Supervision front panel for remote management.

When the optional built-in wireless modem is not equipped, an RS232 port is available on the Supervision front panel for connection to an external PSTN or wireless modem

An OpenVPN application is installed on the Supervision Module to provide remote and secure access to the System using the Internet.

The Supervision Module can also act as an SNMP-agent providing integration into upper-level management systems (NEM).

4 external alarms inputs and 4 dry contacts outputs are available on the Supervision module front panel.

Please note

In order to more handily connect to EXT OUT / EXT IN dry contacts, 2x4-pole female connectors are provided along with the Supervision Module.

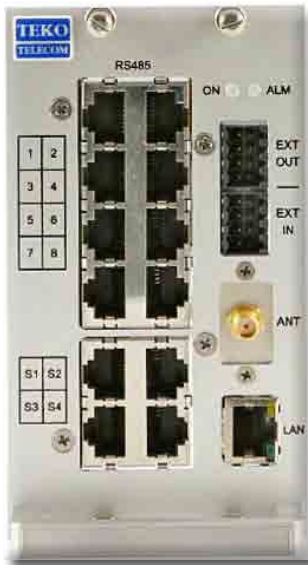


2x4-pole female connector

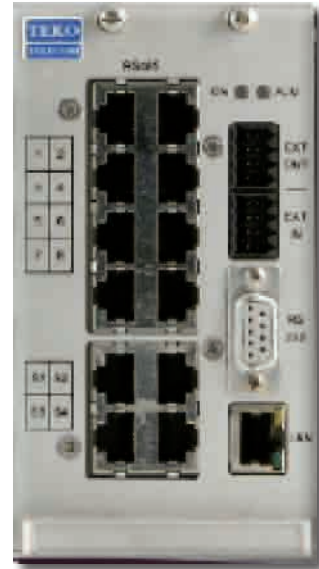
Teko Telecom Operation and Maintenance Terminal (OMT) web pages allow the commissioning, monitoring, setting and troubleshooting of the whole Coverage and Capacity System via a user friendly graphical interface.

Teko Telecom OMC (Operation Management Centre) proprietary software is available to control multiple Supervision Modules managing different Coverage and Capacity Systems in a Network.

Supervision Module Access Points



Supervision Module equipped with optional built-in wireless modem



Supervision Module with RS232 connector

Label (Connectors)	Description
RS485 (1 to 8)	RJ45 connectors for monitored Optical Subracks management
RS485 (S1 to S4)	RJ45 connectors for remote Slave Supervision Modules management
EXT OUT	Dry contacts output connector
EXT IN	External alarms input connector
RS232	9-pole D-Sub RS232 connector for connection to an external modem
ANT	Optional built-in modem input/output connector for remote management
LAN	RJ45 connector Local Control Interface

Label (LEDs)	Description
ON	Supervision Module operating status green LED: ON when power supply is present
ALM	Supervision Module alarm status LED. OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

- **Alarm Board**

The Alarm Board is an optional I/O Module that can be equipped in addition to the Supervision Module, in order to increase the number of supported external alarms.



Alarm Board equipped with 16 input pins - TEA-I16

The Alarm Board allows to manage up to 16 external alarms inputs: 16 external alarms input connectors are available on the module front panel.

The 16 Input lines are opto-isolated and are activated by a short circuit between input pins (max current flow during short = 6mA; max Vdc at input pins = 3,3V).

On request inputs 1-to-4 can be switched to dry output contacts, normally open or closed, depending on HW configuration.

In order to more handily connect to the dry contacts input/output connectors, four 2x4-pole female connectors are provided along with the Alarm Board Module.



2x4-pole female connector

Alarm Board Access Points



Alarm Board
with female dry connectors



Alarm Board
without female dry connectors

Label (Connectors)	Description
EXT IN	External alarms input connector
EXT OUT	Optional external alarms output connector (TEA-112O4)

Label (LEDs)	Description
ON	Alarm Board Module operating status green LED: ON when power supply is present
ALM	Alarm Board Module alarm status LED. OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

1.1.6 Power Supply Modules

- **Power Supply Module**

Power Supply modules are used to supply Active Subracks.

Active Subracks can be AC powered (Universal mains, 85÷264Vac, 50-60Hz) or DC powered (-72 ÷ -36Vdc): they can be equipped with either AC or DC Power Supply modules.

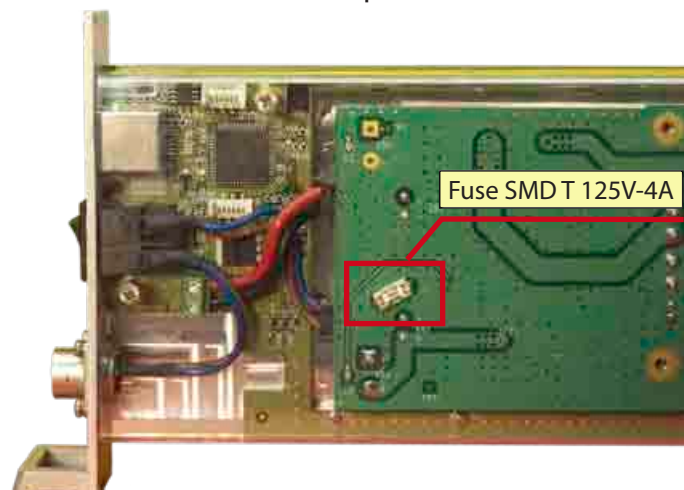


AC Power Supply Module



DC Power Supply Module

The following figure shows the DC/DC Power Supply Module protection fuse position and electrical rating. If the fuse blows, it has to be replaced.



Power Supply modules can be equipped in monitored Active Subracks, in the Master Active Subrack or in a dedicated Active Subrack.

When Power Supply modules are equipped in monitored Active Subracks, the RJ45 connector

available on the Power Supply Module front panel can be used for connection to the Supervision Module, equipped in the Master Active Subrack.

Hot-plug 1+1 Redundancy feature is supported: it can be implemented to achieve high system reliability.

Power Supply Module Access Points



AC Power Supply Module



DC Power Supply Module

Connectors	Description
RS485	RJ45 connector for RS485 connection to the Supervision Module (monitored Subracks)
AC switch	AC MAINS switch
AC MAINS	AC MAINS socket (100-240Vac)

Connectors	Description
RS485	RJ45 connector for RS485 connection to the Supervision Module (monitored Subracks)
DC switch	48Vdc switch
DC MAINS	Vdc input connector (48Vdc)

Label (LEDs)	Description
POWER ON	Power Supply Module operating status green LED: ON when power supply is present
ALM	Power Supply Module alarm status LED. OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

1.1.7 Subracks hosting the System modules

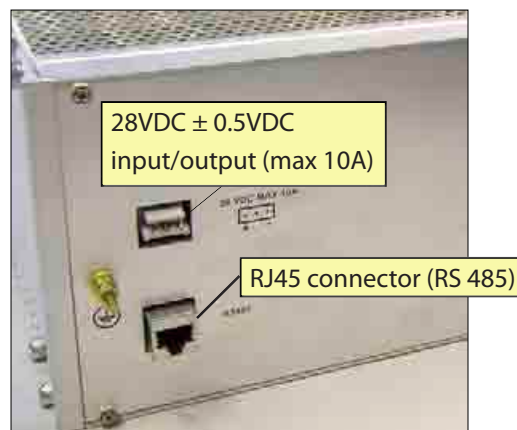
- **Active subracks**

Active Subracks are provided with a backplane that allows the management and power supply of up to 12 active modules and/or Power Supply modules.

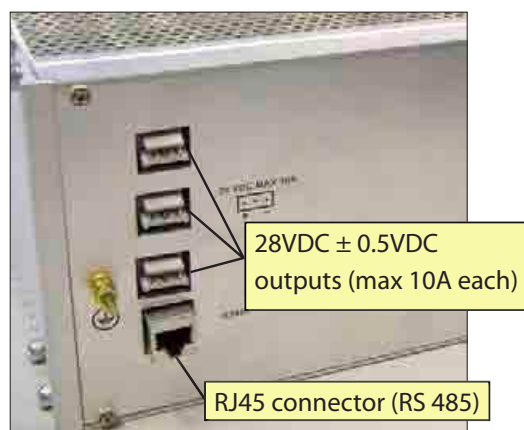
Active subracks can be equipped with either AC or DC Power Supply modules.

The following connectors are available on each active subrack rear panel:

- one or more 28Vdc input/output connectors.
- An RJ45 connector (RS485) to be used when power supply modules are not equipped in monitored Active Subracks. It allows connection of monitored Active Subracks to the Supervision Module.
- A ground bolt.



Active Subrack with one 28Vdc input/output connector



Active Subrack with three 28Vdc input/output connector



Active Subrack provided with ten 28Vdc input/output connectors

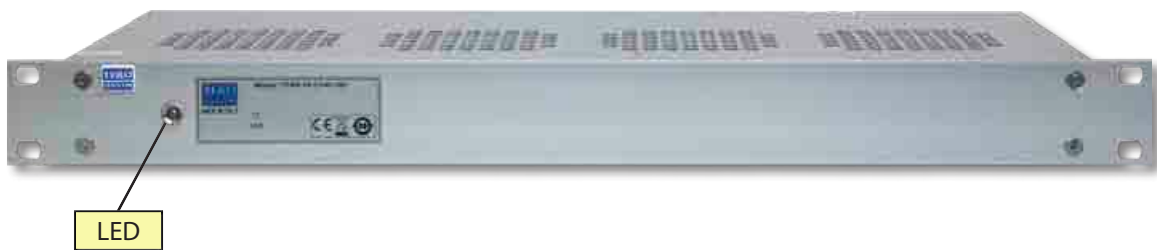
- **Passive subracks**

Passive modules that do not require power nor management to function can be housed in Passive subracks thus allowing a reduction in the cost of the whole system.

1.1.8 Forced-air cooling Subrack

Teko Telecom forced-air cooling subrack is able to provide a maximum air flow of 180cfm (5m³/min) in order to ensure the proper operation of cabinet installed equipment.

Forced-air cooling Subrack Access Points



Forced-air cooling subrack - Front view



Forced-air cooling subrack - Rear view

Access Point	Description
LED	Forced-air cooling subrack general operating status LED Green: normal operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)
RS485	RJ45 connector for RS485 connection to the Supervision Module
28V ~;10A MAX	28VDC ± 0.5VDC input (max 10A)

1.2 Coverage and Capacity Solutions

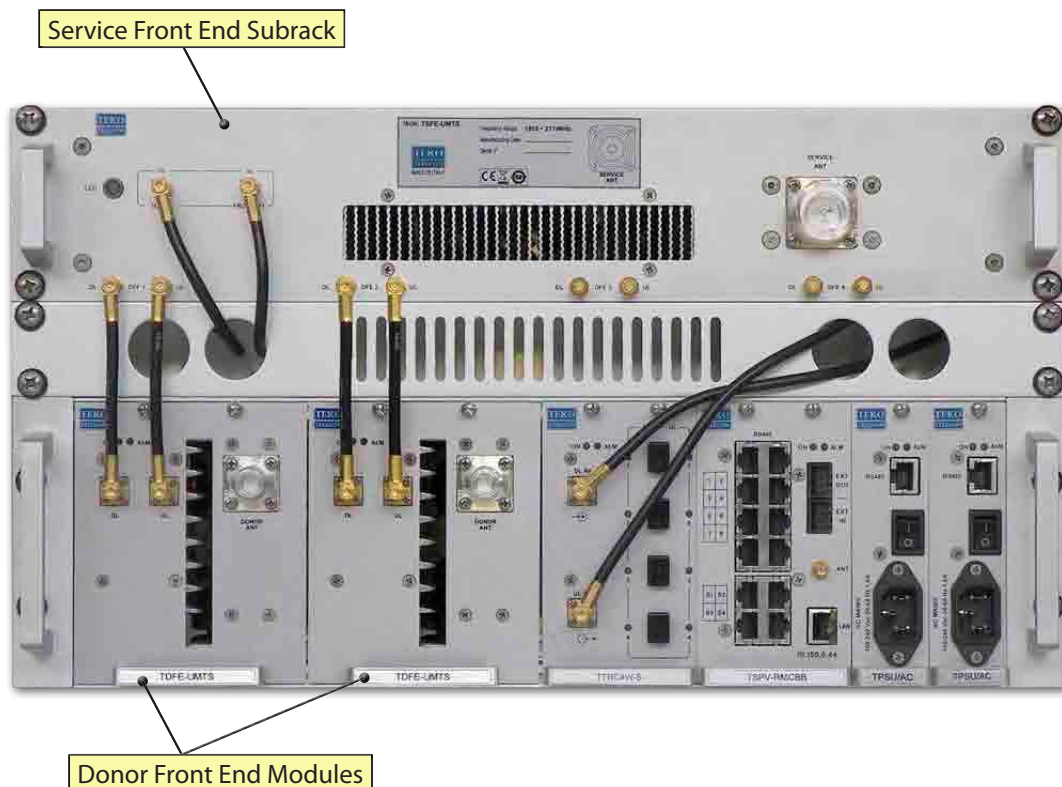
The components of SIRIUS, Teko Telecom Modular Coverage and Capacity System, can be assembled to provide Modular Repeaters, Optical Systems and integrated solutions to improve coverage in different environments.

1.2.1 Modular Off-air Repeaters - General description

Teko Telecom multi-band multi-operator Off-air Modular Repeaters represent the ideal solution for cellular coverage extension, offering a cost effective alternative to dedicated BTSs or Node Bs. They operate over different frequencies and with various frequency combinations in the 380 to 2700MHz frequency range.

No physical connections are required between the Modular Repeaters and the cellular network: the Digital Donor Front End Module is connected to a Donor Antenna, providing the connection towards a BTS or Node B over an air link.

Teko Telecom Modular Off-air Repeaters can be set up by proper combination of Digital Donor Front End Modules and Service Front End Subracks.



The **Digital Donor Front End** is the single-band/single-operator RF interface towards the signal source; the **Service Front End** is the multi-band/single operator equipment that

provides wireless signal to the area to be covered.

Off-air Modular Repeaters can be equipped with one Donor Front End or more Donor Front End modules to make multiple configurations available: single operator (single band / multi-band) and multi-operator (single-band / multi-band).

A single-band single-operator Repeater can be set-up combining a Digital Donor Front End Module and a Service Front End Subrack.

Up to 4 Digital Donor Front End Modules can be connected to a single Service Front End obtaining a single-band 4-operator Off-air Repeater.

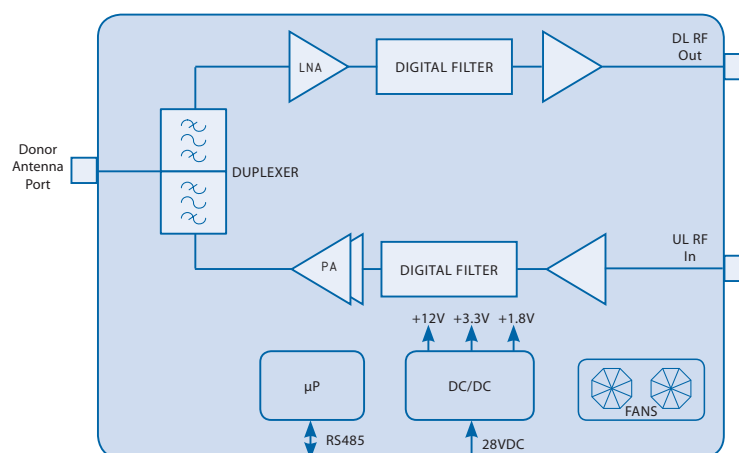
Digital Donor Front End Modules can be connected to different Service Front End Subracks to provide multi-band/multi-operator Systems.

Operating principle

Modular repeaters use a directional antenna to interface with the operator's donor BTS (or Node B) and one or more service antennas to transmit the amplified wireless signals to the area to be covered.

In down-link the repeater receives the signals from the BTS (or Node B), amplifies them and re-transmits them to the mobiles. In the up-link path the repeater receives the signals from the mobiles (MS), amplifies them and re-transmits them to the base station.

Each DFE module hosts the duplexer, to be connected to the Donor Antenna to separate/combine Downlink and Uplink paths.



In downlink the signal from the Donor antenna is preamplified by a Low Noise Amplifier and

converted into an IF signal by a downconverter. The selection of the band of frequencies or channels to be extended is handled by a digital filter.

The digital filtering can manage 1 variable band or 2 variable sub-bands.

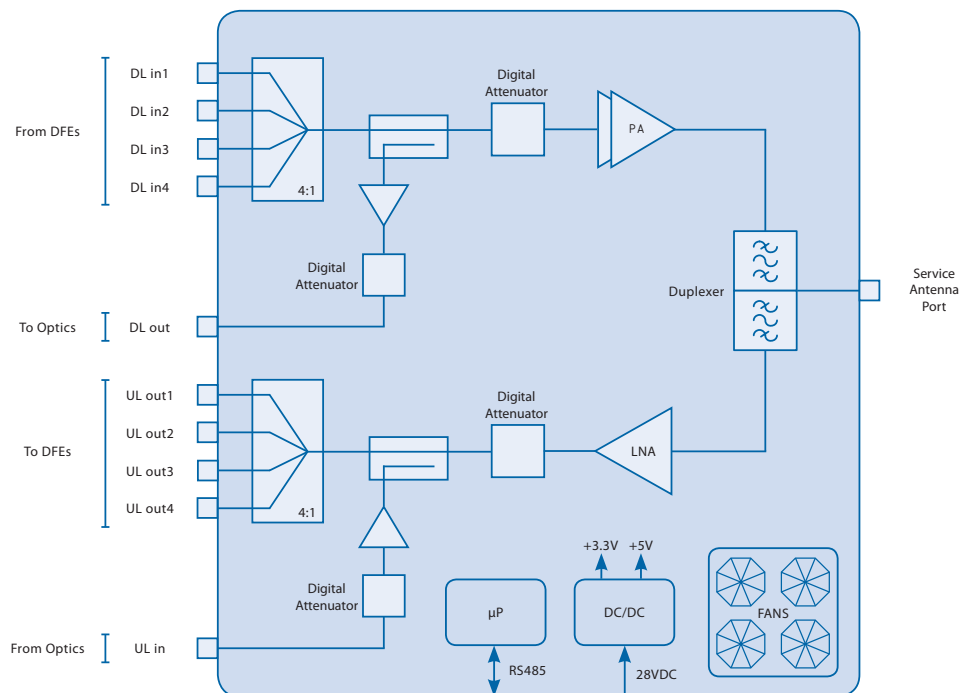
An upconverter converts the IF signal into an RF signal.

In uplink the signal from the Service Front End Subrack is converted into an IF signal by a downconverter, filtered and re-converted into an RF signal, amplified by a power amplifier and re-transmitted to the signal source.

Each TSFE subrack hosts the duplexer, to be connected to a Service antenna to separate/combine Downlink and Uplink paths.

In Downlink the signals from the Donor Front-End Modules are combined, amplified (High Power Amplifier) and then transmitted to the area to be covered by the Service Front End Subrack.

In Uplink, the RF signal from the Service antenna is amplified by a Low Noise Amplifier (LNA) and split to feed up to 4 Donor Front-End Modules.



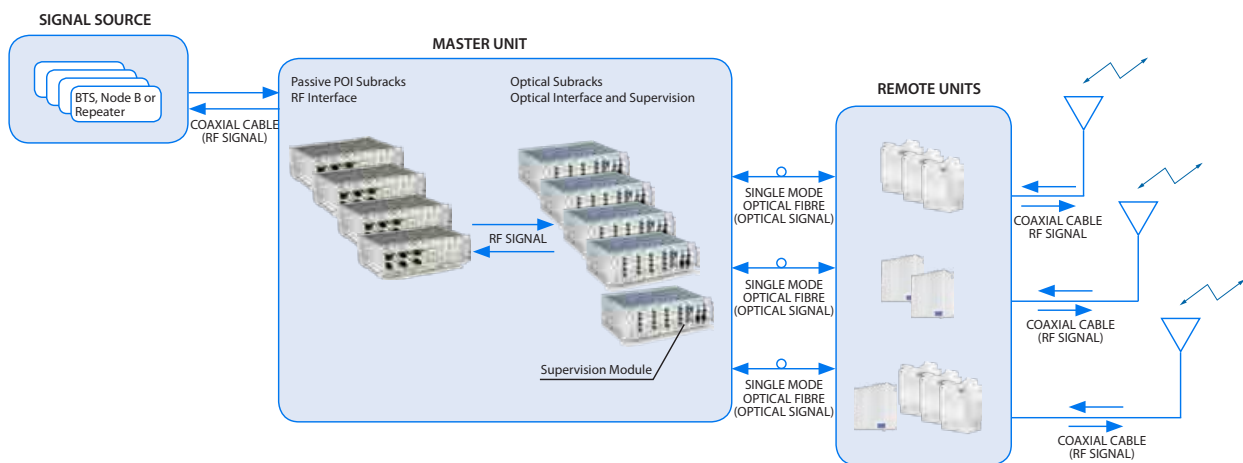
When a single Repeater does not provide satisfactory coverage, for example when extensive areas or long tunnels are to be covered, Modular Repeaters can be used along with a fiber fed System (Teko Telecom Optical System).

1.2.2 Optical Systems - General Description

Teko Telecom Coverage and Capacity System components can be configured to provide a modular multi-band multi-operator Optical System.

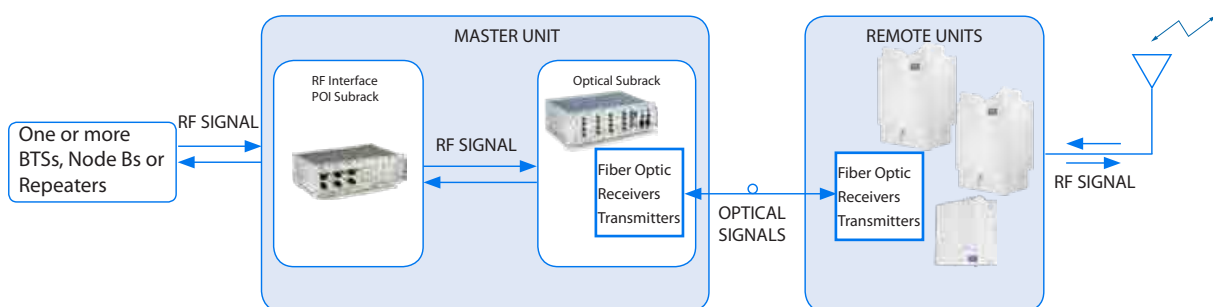
Optical Systems are based on the Radio over Fibre technology, which enables radio signals transmission over optical fibres. This technology offers wide bandwidth and very little loss along the fiber optic fibre, allowing the signals to be propagated over long distances. This allows extensive areas coverage.

Each Teko Telecom Optical System is made up of two main parts: the Master Unit, interfacing the signal source, and Remote Units, distributed throughout the territory to be served. Master Unit and Remote Units are connected via single mode optical fibres (SMR 9/125).



A – Master Unit

The **Master Unit** provides both the RF interface towards the signal source (one or more BTSs or Node Bs) and the optical interface towards Remote Units.



It is a rack-based modular equipment: Teko Telecom Coverage and Capacity Systems components can be assembled in a variety of ways providing different Master Unit configuration

options.

Each Master Unit can be equipped with one or more RF interface subracks (subracks hosting RF interface modules) and with one or more Optical Subracks (Active Subracks hosting Fiber Optic Transmitter/Receiver modules).

When the Master Unit is equipped with Master and Slave Point to Point Modules, RF interface subracks and optical subracks can be separated by a maximum distance of 20km.

- **RF interface subracks**

RF Interface subracks operate over different frequencies and with various frequency combinations in the frequency range from 380 to 2700MHz.

Each RF interface subrack can be equipped with one or more RF Interface modules. Each module interfaces to a single mobile operator / mobile standard signal source, making multiple configurations available: single operator (single band / multi-band) and multi-operator (single-band / multi-band).

Master Unit RF Interface modules can be Point of Interface (POI/TAPOI) modules and/or Donor Front End modules.

Point of Interface modules are connected to the signal source via coaxial cable: each module is connected to a single operator/ single standard signal source (BTS or Node B). Master Units equipped with POI/TAPOI modules must be installed next to the donor BTS or Node B.

POI modules can be equipped in passive subracks; TAPOI modules require active subracks (SUB-TRX).

Donor Front End modules allow the Optical System to be driven without the need of a dedicated BTS or Node B: each Donor Front End module interfaces with a Donor Antenna oriented towards a BTS or NodeB (connection over an air link).

Donor Front End modules require an active subrack (SUB-TRX). Each subrack can be equipped with up to 4 Donor Front End Modules.

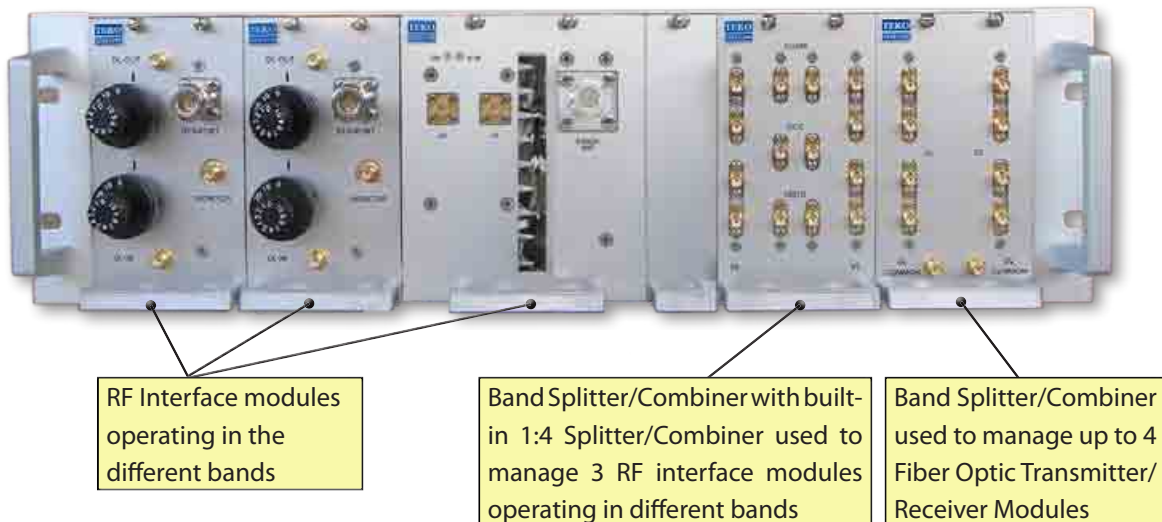
RF Interface subracks also host **passive modules providing distribution and filtering**:

- 1:4 Splitter/Combiner and
- Band Splitter/Combiner (Triplexer) with built-in 1:4 Splitter/Combiner.

Due to the flexible configuration options of Teko Telecom Coverage and Capacity Systems, the same passive modules can be used for different purposes:

- the 4-way splitter/combiner can be used to manage: multiple RF interface modules, operating in the same band (Multi-Operator Optical Systems) or multiple Fiber Optic modules;

- the triplexer can be used to manage
 - up to 3 RF interface modules operating in different bands and up to 4 Fiber Optic Transmitter/Receiver Modules or
 - up to 3 Service Front End subracks operating in different bands and up to 4 Fiber Optic Transmitter/Receiver Modules or
 - up to 3 four-way splitter/combiner - used to manage multiple RF interface modules (up to 4 for each band) - and up to 4 Fiber Optic Transmitter/Receiver Modules.



Example: active RF Interface subrack equipped with 2 POI modules and 1 DFE module operating in different bands, Band Splitter/Combiner with built-in 1:4 Splitter/Combiner, 1:4 Splitter/Combiner

The RF Interface subracks can also be equipped with up to 4 Master Point to Point modules for the management of up to 4 optical subracks installed in different remote locations.

Digital Donor Front End modules can be connected to Service Front End Subracks to provide coverage to the area adjoining the Master Unit site.

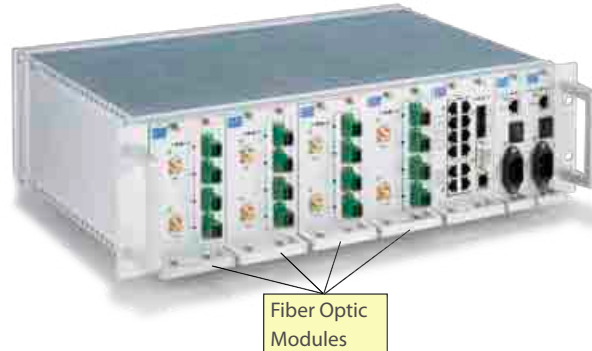
Each Service Front End can be fed by up to 4 Donor Front-End Modules interfacing the signal source. Downlink and uplink auxiliary ports are available to drive the Optical System.



Service Front End Subrack

- **Optical Subracks**

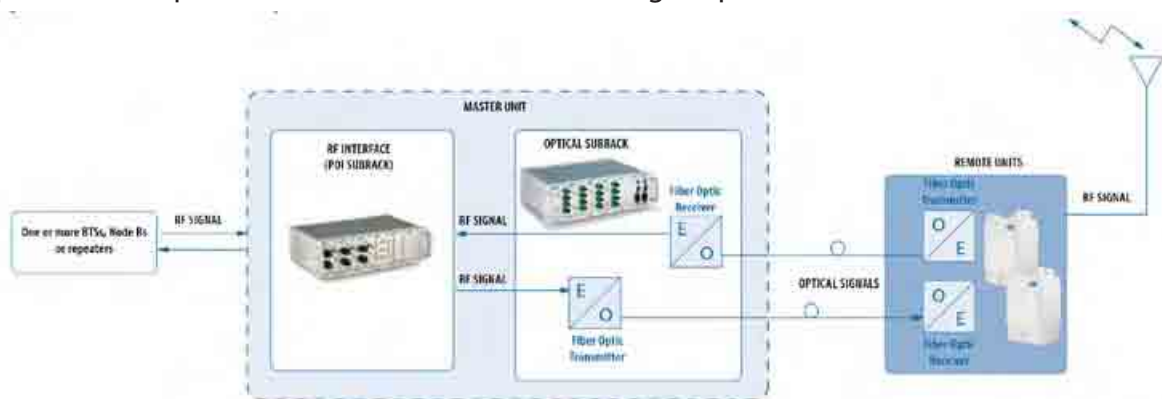
Optical Subracks are Active Subracks hosting Fiber Optic Transmitter/Receiver modules.



Fiber Optic Transmitter/Receiver modules are the optical interface towards Remote Units: they provide RF to optical /optical to RF conversion.

Fiber Optic modules are connected to Remote Units via single-mode optical fiber (SMR 9/125); each Fiber Optic Module can manage up to 4 Remote Units (up to 5 in cascade configuration).

Up to 6 Fiber Optic Modules can be housed in a single Optical Subrack.



In Downlink RF signals are converted into optical signals in the Fiber Optic Transmitter modules of the Master Unit and then they are propagated through optical fibre distribution to Remote Units. In the Fiber Optic Receiver of each Remote Unit, the optical signal is then converted back into an RF signal that is amplified and transmitted to mobiles through an antenna or a passive distribution system.

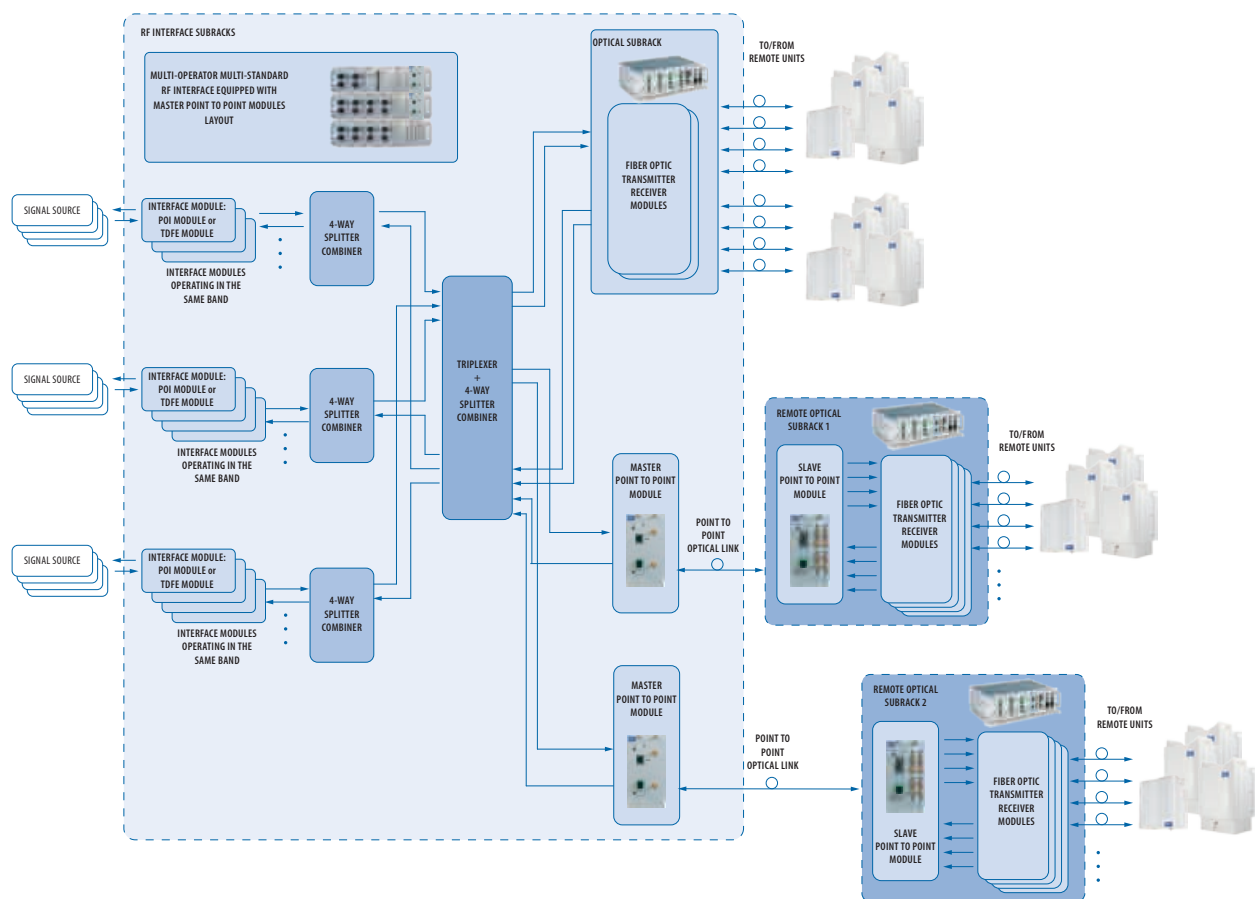
In Uplink RF signal is converted into an optical signal in the Fiber Optic Transmitter of each Remote Unit and then it is propagated via fibre optics to the Master Unit. Optical signals from Remote Units are then converted by the Fiber Optic Receiver modules of the Master Unit into RF signals and transmitted to the signal recipient.

Uplink and downlink optical signals are transmitted over the same single mode optical fibre (Wavelength Division Multiplexing -WDM- technology).

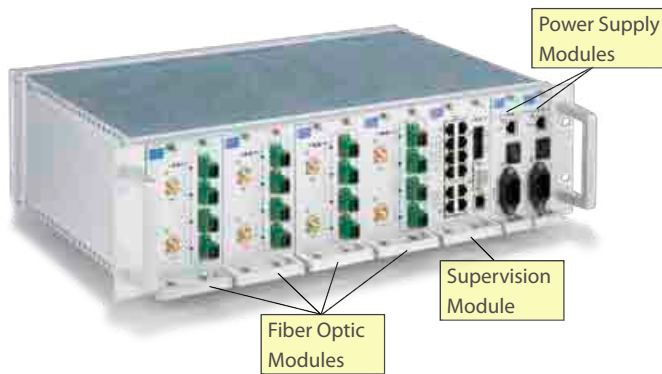
The Master Optical Subrack also hosts the Supervision Module for the management of the whole System.

When the Coverage System includes point to point links, each remote optical subrack hosts the Slave point to point module to be connected, via optical fibre, to its Master Point to Point module, equipped in the RF interface subracks.

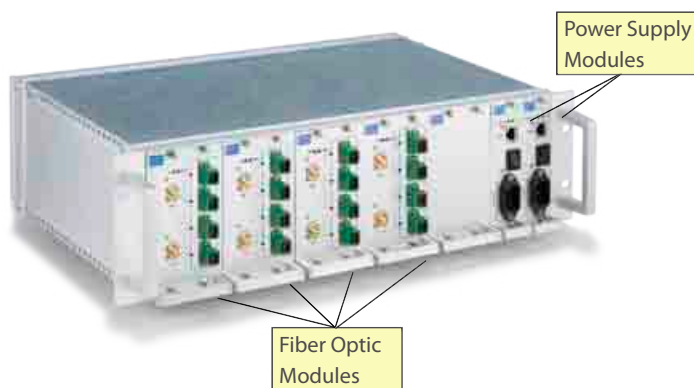
The slave point to point module includes the 4-way splitter/combiner to manage up to 4 Fiber Optic Transmitter/Receiver Modules and a built-in Supervision unit for the management of the remote subrack and connected Remote Units.



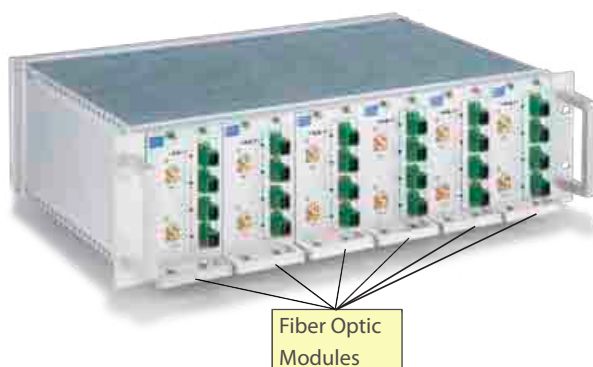
Optical Subracks can be AC or DC powered. Power Supply modules can be equipped in monitored Optical Subracks or in the Master Optical Subrack or in dedicated Active Subracks.



Example of Master Optical Subrack hosting the Supervision module, 4 Fiber Optic Transmitter/Receiver modules, and 2 Power Supply Modules (the second Power Supply Module, optional, provides power supply redundancy for higher reliability)



Example of Monitored Optical Subrack equipped with 4 Fiber Optic Transmitter/Receiver Modules and 2 Power Supply Modules



Example of Monitored Optical Subrack equipped with 6 Fiber Optic Transmitter/Receiver Modules

B – Remote Units

Remote Units distribute wireless signals throughout the area to be covered ; they can be installed up to 20km (12.4miles) from the Master Unit site.

Remote Units can be Single, Dual or Tri-band with different power classes: Very High, High, Medium and Low.



Single, Dual or Tri-band Very High, High and Medium Power Remote Unit



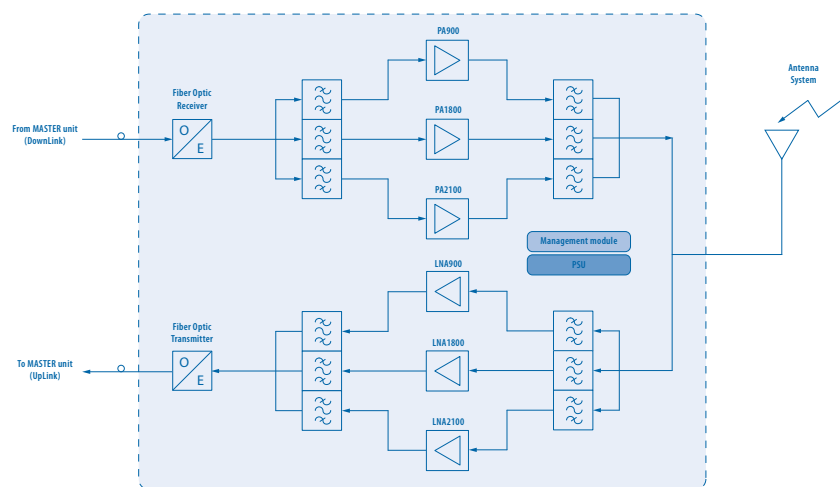
Single, Dual or Tri-band Low Power Remote Unit

Remote Units are equipped with the Fiber Optic Receiver and Transmitter module (for Optical to RF and RF to Optical conversion) power amplifiers and filtering.

A single Master Unit can drive up to 144 Remote Units. Various network structures can be supported by the Master Unit: the Remote Units of the same Optical System can be deployed with a point-to-point connection (star-configuration - using one fiber optic per Remote Unit) or with cascading of up to 5 Remote Units using a single fibre and optimized optical couplers.

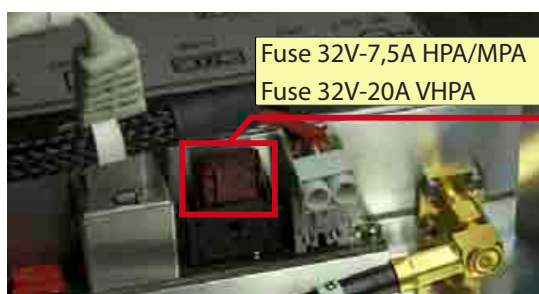
The following figure shows the Tri-band Remote Unit block diagram: in down-link the optical signal from Master Unit is converted into an RF signal by the Fiber Optic Receiver module. RF signals, filtered by the triplexer, are amplified by Low, Medium, High or Very High Power amplifiers (Low, Medium, High or Very High Power Remote Units), filtered and transmitted through an antenna or a passive distribution system.

In up-link the RF signal is filtered by the triplexer. The three RF signals are amplified by Low-Noise Amplifiers, filtered and then converted into an optical signal by the Fiber Optic Transmitter module. The signal is transmitted via fiber optics to the Master Unit.

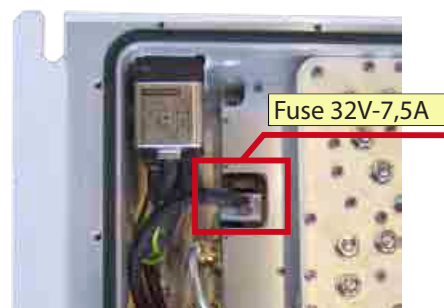


Example: Tri-band Remote Unit block diagram

Please Note: each final power amplifier is protected by a fuse.



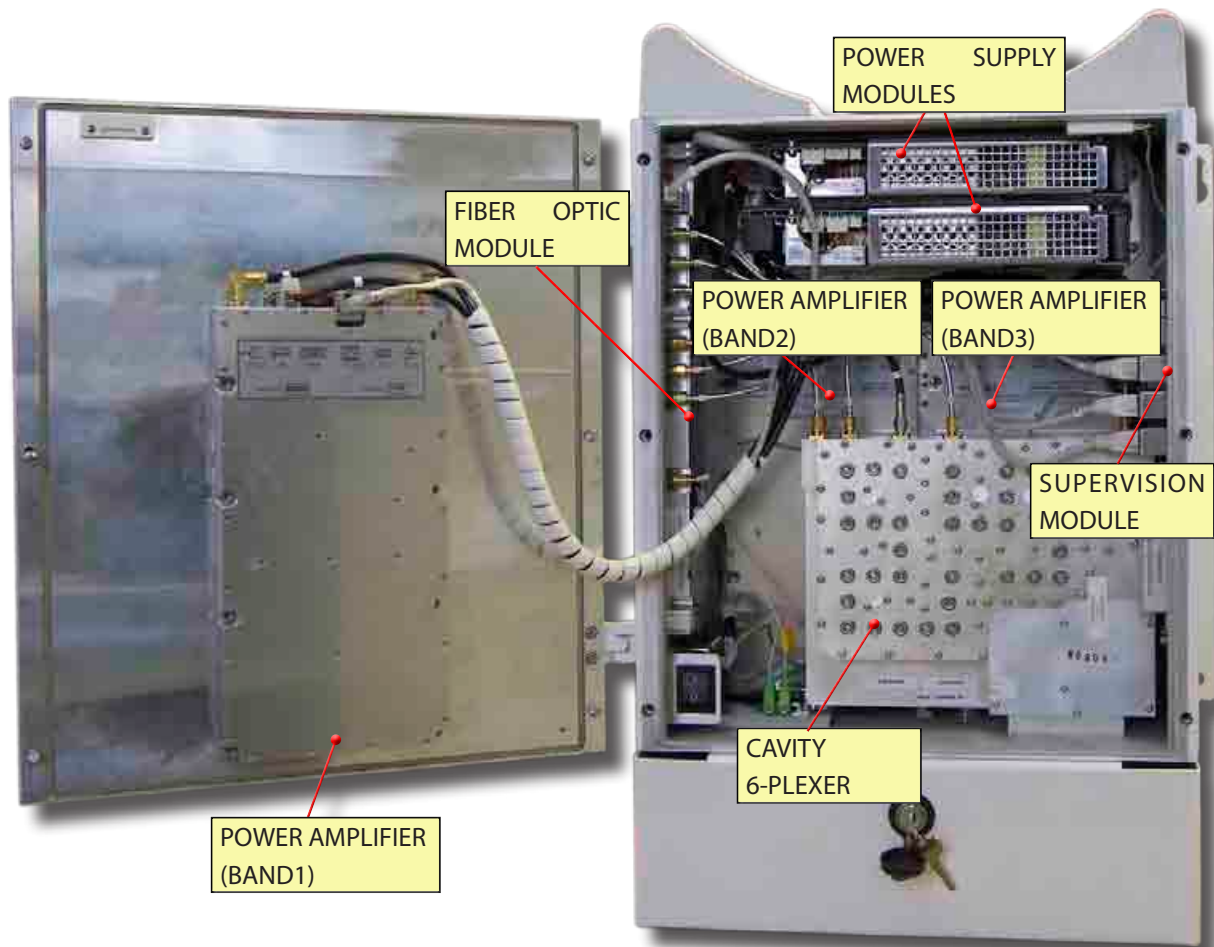
Very High Power/High Power/Medium Power final amplifiers fuse position and electrical rating



Low Power final amplifier fuse position and electrical rating

The management module collects information relevant to the various modules. An RF modem allows data communication over fiber between Remote Unit and Master Unit.

- **High/Medium Power Remote Units Composition**



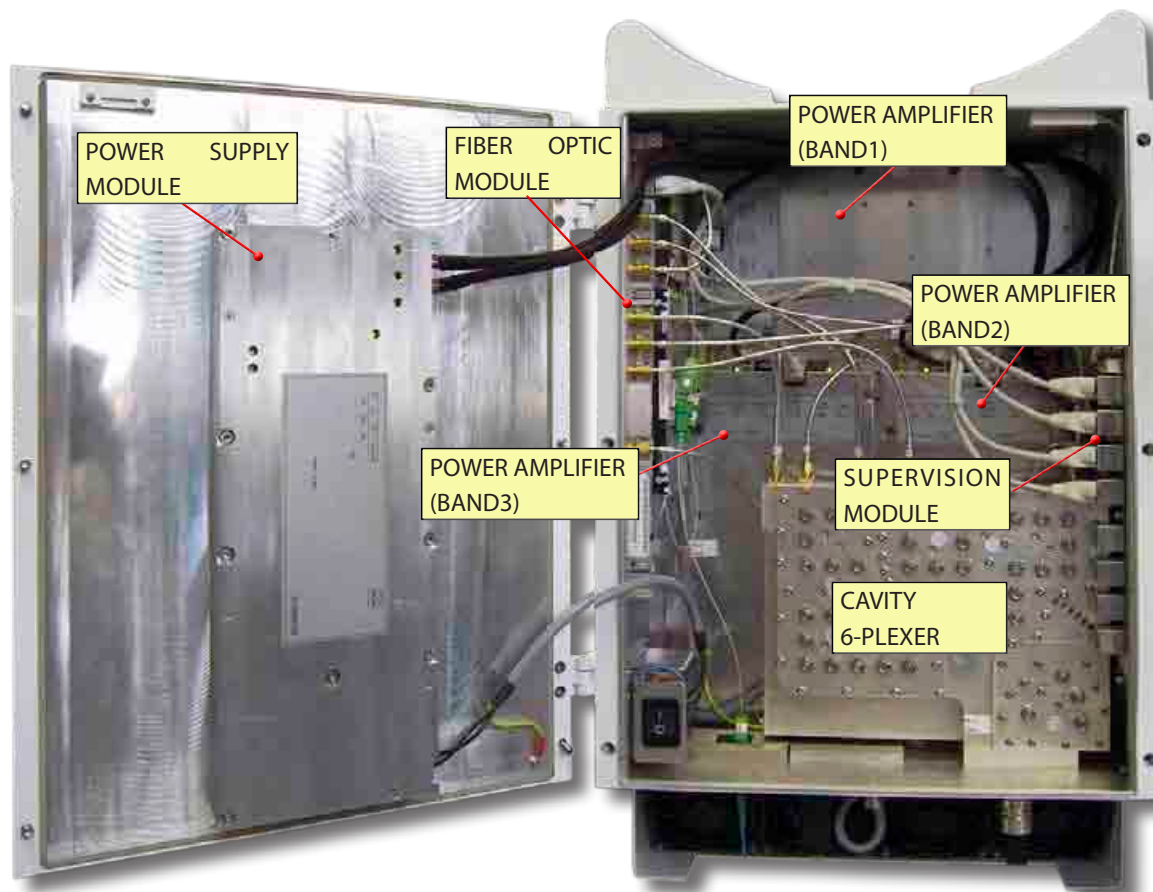
PLEASE NOTE:

The Very High/High/Medium Power Remote Unit case is equipped with a lock to guarantee protection of the equipment. The following procedure describes how to open the equipment.

OPENING THE REMOTE UNIT

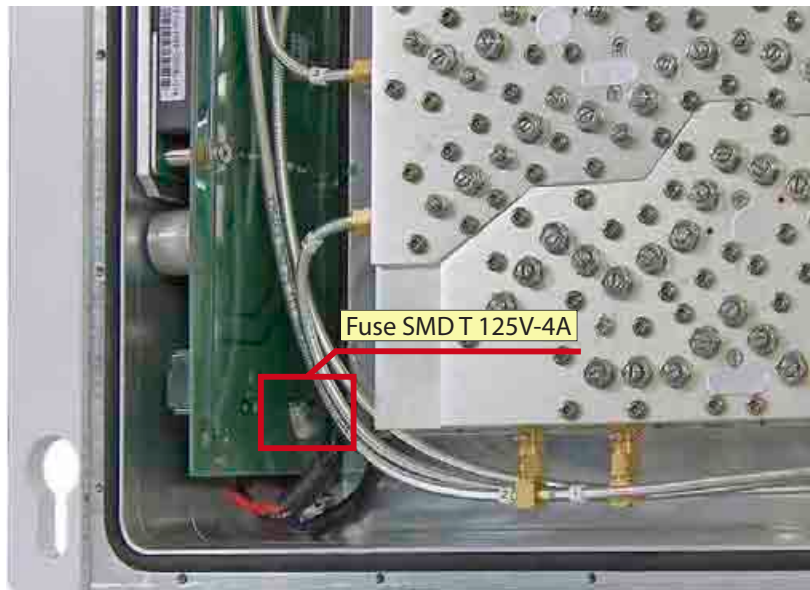
- Unlock the cables protection using the keys delivered with the equipment
- Remove the cables protection
- Remove the Remote Unit cover, sliding it downwards
- Unscrew the 6 screws on the Remote Unit door
- Open the Remote Unit door.

Very High Power Remote Unit Composition



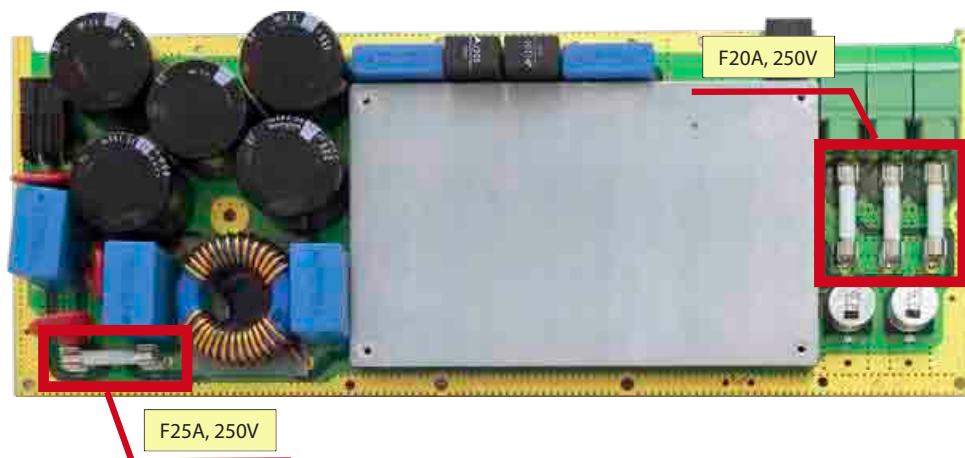
Low Power Remote Units can be either AC powered (Universal mains, $85 \div 264\text{Vac}$, 50-60Hz) or DC powered ($-72 \div -36\text{Vdc}$).

The following figure shows the DC powered Low Power DC/DC Power Supply Module protection fuse position and electrical rating.



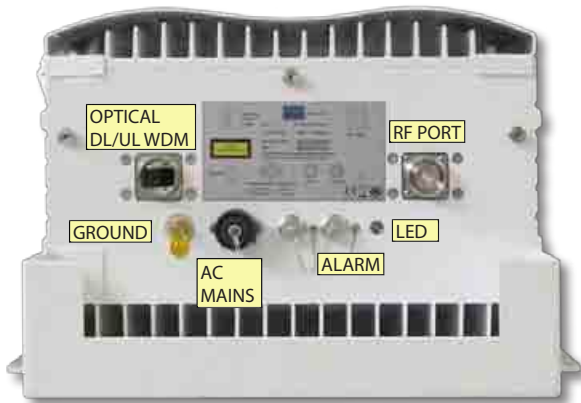
Very High/ High and Medium power Remote Units are AC powered (Universal mains, $85 \div 264\text{Vac}$, 50-60Hz).

The Very High Power Remote Unit Power Supply module is protected by 4 fuses. The following figure shows the protection fuses position and electrical ratings.

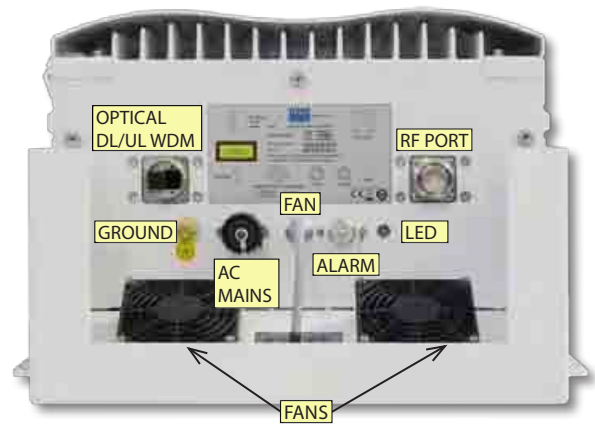


- Remote Units External Access Points

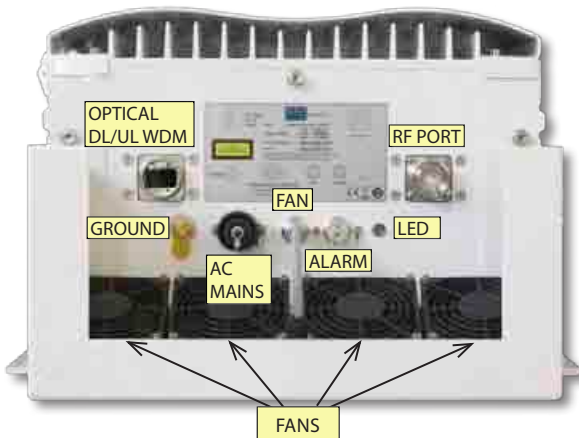
Medium/ High and Very High Power Remote Units External Access Points



Medium power and Single band high power Remote Units
Bottom view



Dual band/Triband high power Remote Units
Bottom view



Very high power Remote Units and high power Remote Units
equipped with amplifiers operating in the LTE2600 band
Bottom view

**REMOTE UNIT GENERAL OPERATING STATUS
LED DESCRIPTION (LED)**

Green: regular operation (no alarm)

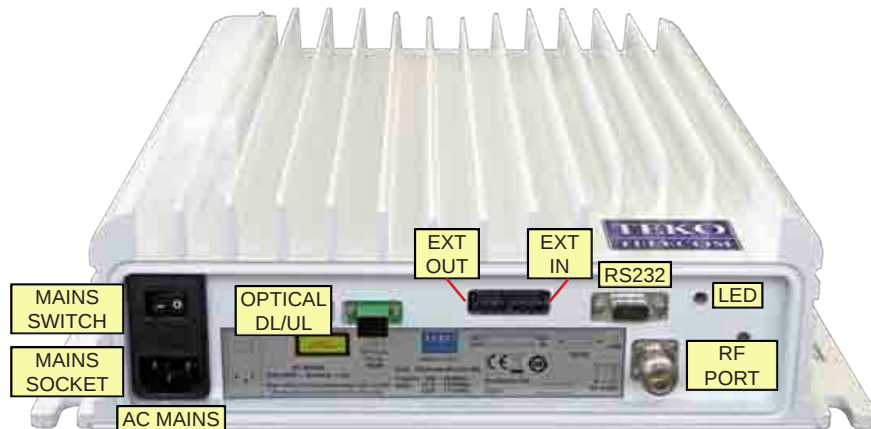
Blinking Orange: presence of active alarms with **warning** severity level (4)

Orange: presence of active alarms with **minor** severity level (3)

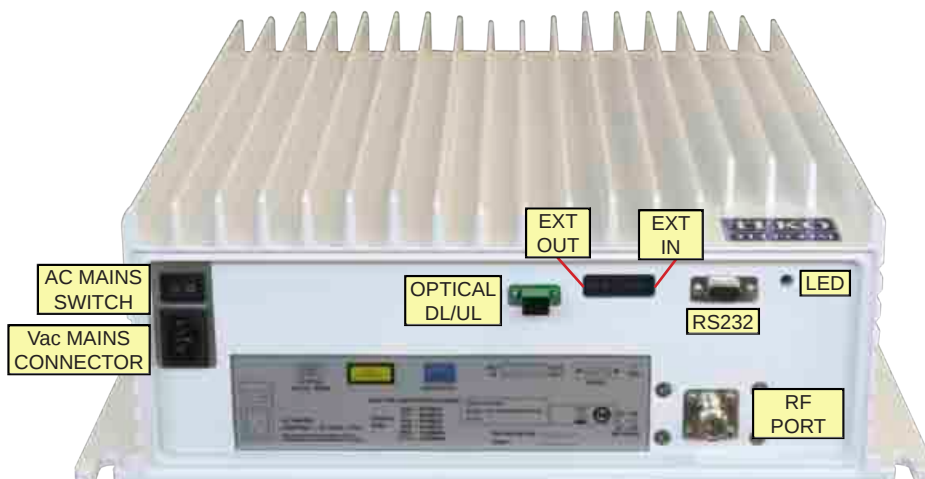
Blinking Red: presence of active alarms with **major** severity level (2)

Red: presence of active alarms with **critical** severity level (1)

Connectors	Description
RF PORT	Down Link/Up Link 7/16 RF connector
OPTICAL DL/UL WDM	Optical fibres input/output connector
GROUND	Equipment grounding
AC MAINS	AC voltage input (100-240Vac)
FAN	Fans power supply and control connector
ALARM	Auxiliary alarms connector (4 in, 4 out)

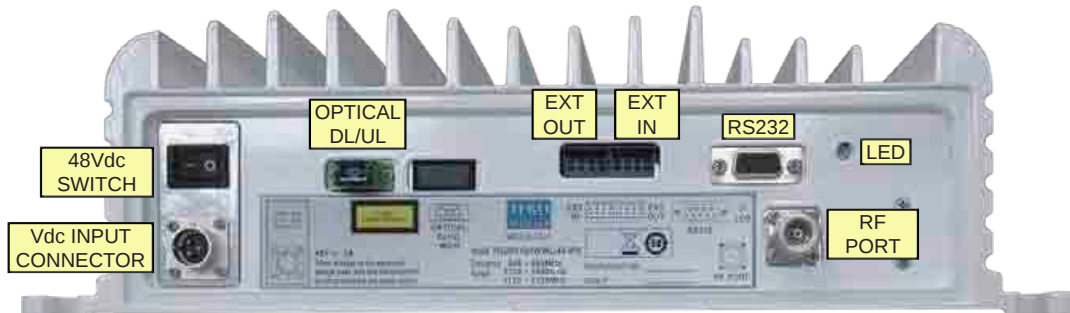
Low Power Remote Units External Access Points (AC Powered)

Single/Dual/Tri-Band Low Power Remote Units External Access Points



Six-Band Low Power Remote Unit External Access Points

Connectors	Description
RF PORT	Down Link/Up Link RF connector (N type)
OPTICAL DL/UL	Optical fibres input/output connector
AC MAINS	AC voltage input (100-240Vac) and switch
EXT OUT	External alarms output connector
EXT IN	External alarms input connector
RS 232	9-pole D-Sub RS232 connector for Local Management
LED	Remote Unit general operating status LED Green: no alarm Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

Low Power Remote Unit External Access Points (DC Powered)

Connectors	Description
RF PORT	Down Link/Up Link RF connector (N type)
OPTICAL DL/UL	Optical fibres input/output connector
48V 3A	Vdc input connector (48Vdc) and switch
EXT OUT	External alarms output connector
EXT IN	External alarms input connector
RS 232	9-pole D-Sub RS232 connector for Local Management
LED	Remote Unit general operating status LED Green: no alarm Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

1.2.3 Coverage Systems Management and Power Supply Management

Teko Telecom Supervision Module (TSPV) allows the management of the entire Coverage and Capacity System.

The System Supervision Module is able to manage the Active Subrack it is equipped in (Master Subrack) and up to other 12 Active Subracks (Monitored Subracks).

Twelve ports (1 to 8 and S1 to S4) are available on the Supervision Module front panel to be connected to the RS485 ports of monitored Active Subracks.

The ports numbered from 1 to 8 are available for the connection to monitored subracks mounted within the same rack hosting the Master Subrack.

The other four ports (S1 to S4) are available for the management of remote subracks equipped with Slave supervision units.

When the Coverage System includes point to point links these ports allow the management of the Slave Point to Point modules built-in Supervision units. Each Slave Point to Point module Supervision unit manages the remote optical subrack - hosting the module - and all connected Remote Units.

The Coverage System Supervision Module communicates with the Slave Point to Point built-in Supervision via the single-mode optical fiber (SMR 9/125) connecting Master and Slave Point to Point modules.

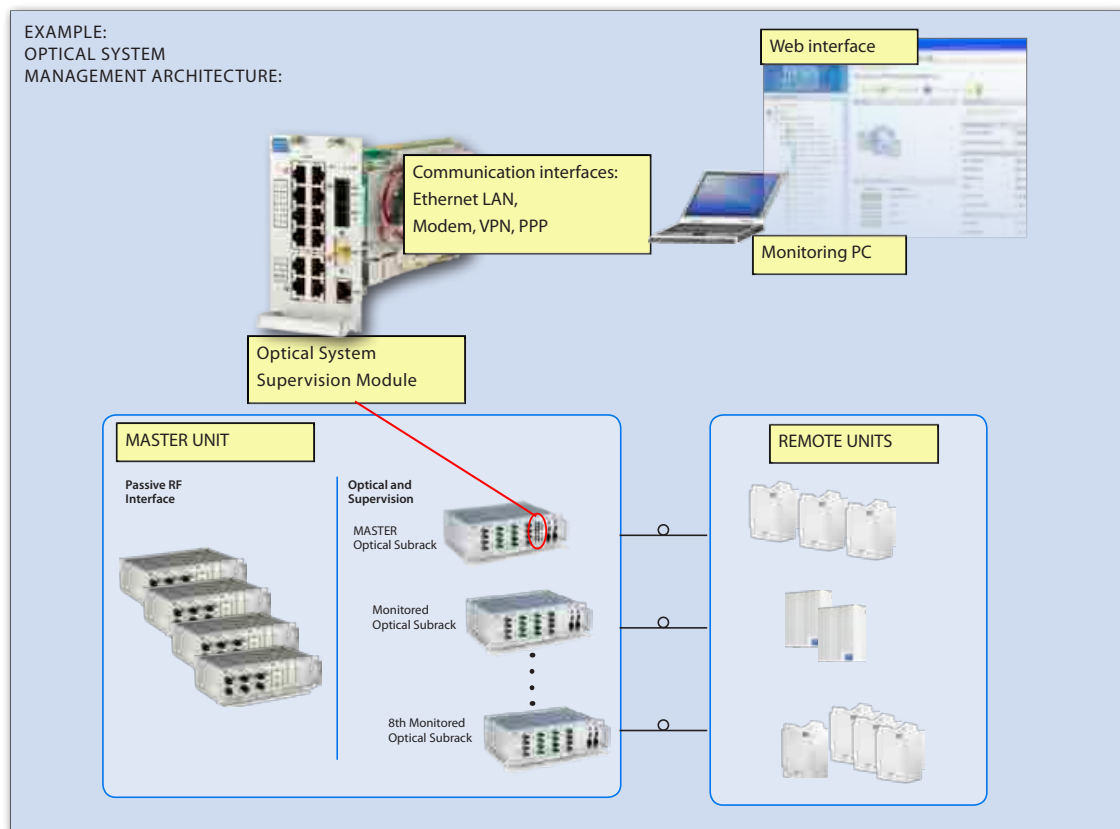
When the Coverage System does not include point to point links, the master supervision module communicates with the Remote Units via the single-mode optical fiber (SMR 9/125) connecting Fiber Optic modules to Remote Units.

Address assignement

Each monitored Subrack takes its address from the Supervision Module port it is connected to (please refer to Paragraph 2.2.2 RS485 Connections for details).

The Active Subrack equipped with the Supervision Module (Master Subrack) takes address = 0 (zero).

The whole Coverage System can be accessed and managed simply connecting a PC, either locally or remotely, to the IP address of the System Supervision Module.



Local management is performed connecting a PC to the Ethernet port (LAN, RJ45 connector), available on the Supervision Module front panel. A local connection is required to perform commissioning.

For remote control the System can be accessed via Ethernet, via external PSTN or wireless modem or via optional built-in wireless modem.

The management of the System is performed via web pages: the Supervision Module is equipped with a web-server and each component of the System is associated to a web page displaying detailed information about the component.

The Supervision Module is also equipped with an SNMP-agent, which allows the control of each parameter of the system via SNMP get/set/trap operations.

The Supervision Module is also provided with an OpenVPN application that allows remote and secure access to the System using the Internet.

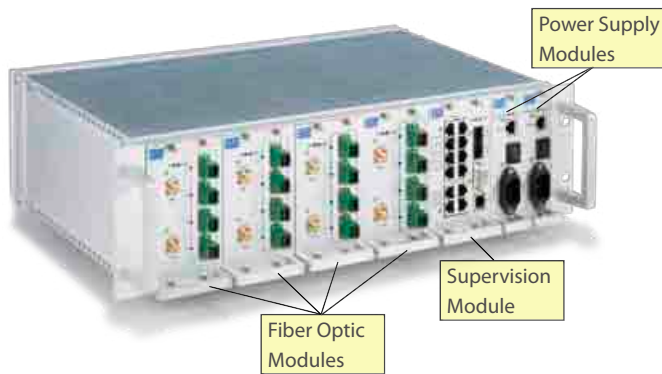
Teko Telecom Operation and Maintenance Terminal (OMT) web pages show the Coverage System operating parameters and alarm status. They allow the commissioning, monitoring,

setting and troubleshooting of the whole Coverage System.

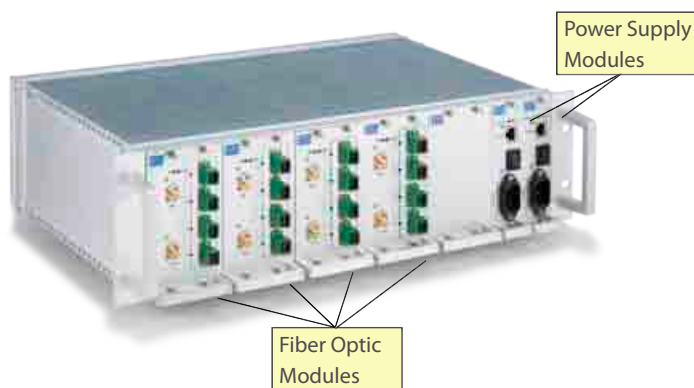
Teko Telecom Operation Management Centre (OMC) proprietary software allows the management of multiple Teko Telecom Coverage and Capacity Systems in a Network. OMC is a client-server application: the server collects information, such as System status and alarms, relevant to the Systems in the Network. The Server communicates with each System Supervision Module via Ethernet (TCP-IP socket) or via PSTN or wireless modem. The Client provides access to the information stored in the Server database. It allows end-users to check the status of the Coverage Systems in the Network via a user friendly graphical interface.

Power Supply

Coverage Systems can be AC or DC powered. Power supply modules can be equipped in monitored Active Subracks or in the Master Subrack or in dedicated Active Subracks.



Example of Power Supply Modules equipped in the Master Optical Subrack (the second Power Supply Module, optional, provides power supply redundancy for higher reliability).



Example of Power Supply Modules equipped in a monitored Active Subrack. The RJ45 connector available on the Power Supply Module front panel can be used for connection to the Supervision Module, equipped in the Master Active Subrack.



Example of Power Supply Modules equipped in a dedicated Active Subrack.

1.2.4 Teko Telecom Coverage Systems Technical Specifications

This paragraph makes Coverage and Capacity Systems mechanical, environmental and power supply specifications available. Please refer to product datasheets for detailed electrical specifications. Contact Teko Telecom Sales Office for further information.

• Remote Units

Remote Unit model	Dimensions (HxWxD)	Weight	Operating temperature range	Degree of protection (IP)	Power supply
LOW POWER					
Single / Dual / Triband	350x350x100mm (13.78x13.78x3.94 in) max volume - heat sinks and connectors included	13 kg (28.7 lbs)	-20°C up to +55°C (-4°F up to +131°F)	IP32 (box) IP66 (with optional protection kit)	85÷264Vac (50-60Hz) /AC version -72 ÷ -36Vdc /48 version
6-band	414 x 395 x 144 mm (24.41x16.34x10.24 in) max volume - heat sinks and connectors included	19 kg (41.9lbs)			
MEDIUM POWER					
Triband	570x415x260mm (22.44x16.34x10.24 in) max volume - heat sinks, handles and connectors included	30 kg (66.1 lbs)	-20°C up to +55°C (-4°F up to +131°F)	IP66	85÷264Vac (50-60Hz)
Dual band		28 kg (61.73 lbs)			
Single band		26 kg (57.32 lbs)			
HIGH POWER					
Triband	570x415x260mm (22.44x16.34x10.24 in) max volume - heat sinks, handles and connectors included	32 kg (70.5 lbs)	-20°C up to +55°C (-4°F up to +131°F)	IP66	85÷264Vac (50-60Hz)
Dual band		30 kg (66.1 lbs)			
Single band		28 kg (61.73 lbs)			
VERY HIGH POWER					
Triband	620x415x260mm (24.41x16.34x10.24 in) max volume - heat sinks, handles and connectors included	38 kg (83.78 lbs)	-20°C up to +55°C (-4°F up to +131°F)	IP66	85÷264Vac (50-60Hz)
Dual band		37 kg (81.57 lbs)			
Single band		36 kg (79.37 lbs)			

- **System Subracks**

Dimensions	19" - 3U racks / depth 270 mm (10.63 in) - Active and Passive Subracks
	19" - 2U rack / depth 360 mm (14.17 in) - Service Front End Subrack
	19" - 1U rack / depth 270 mm (10.63 in) - Forced-Air Cooling Subrack
Power supply (Active Subracks)	85÷264Vac (50-60Hz) (TPSU/AC) -72÷-36Vdc (TPSU/48)
Operating temperature range	-5°C up to +55°C (+23°F up to +131°F) with proper forced-air cooling

Castel San Pietro Terme, 28 July 2011

Nemko Canada Inc
303 River Road
Ottawa, Ontario, Canada
K1V 1H2

Attn: Director of Certification

Authority to Act as Agent

On our behalf, I appoint Nemko Spa – via del Carroccio n. 4, Biassono (MB) Italy to act as our agent in the preparation of this application for equipment certification. I certify that submitted documents properly describe the device or system for which equipment certification is sought. I also certify that each unit manufactured, imported or marketed, as defined in the Federal Communications Commission's regulations will have affixed to it a label identical to that submitted for approval with this application.

For instances where our authorized agent signs the application for certification on our behalf, I acknowledge that all responsibility for complying with the terms and conditions for certification, as specified by Nemko Canada Inc, still resides with (applicant name and address).

Dated 28 July 2011

By: Alessandro Brunelli **ALESSANDRO BRUNELLI**
Signature **Printed**

Title: CERTIFICATION ENGINEER

On behalf of : TEKO TELECOM

Telephone: +39 051 6946811

TEKO TELECOM S.p.A.
Via Meucci, 24/a
40024 CASTEL S.PIETRO T. (BO)
P.IVA e C.F. 02186561201