



siae microelettronica

**TL – TRUNK LINK
IP / SDH**



Trunk Link - CS - July 2011

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"TL" Trunk Link IP/SDH Radio (FRX-3)

Main characteristics:

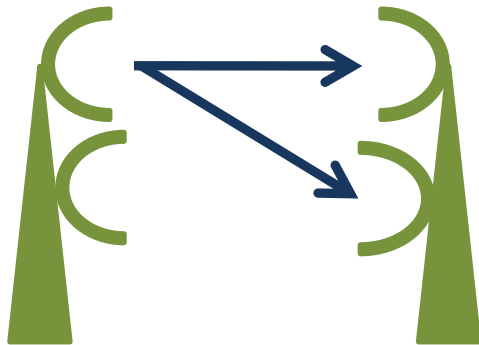
- **Frequency Range** from 4 to 13 GHz
- **Configurations** up to 16+0 or 2x(7+1) with XPIC Repeater and dual frequency bands
- **Capacity** 16xSTM1 or 3.2Gbit/s
- **Modulation** ACM 4/16/32/64/128/256 QAM
ADAPTIVE MODULATION
- **Interfaces** STM-1 up to 16
Native ETH interface up to 3.2GB
- **Layer 2 swicth embedded providing L2 ETH functionalities**



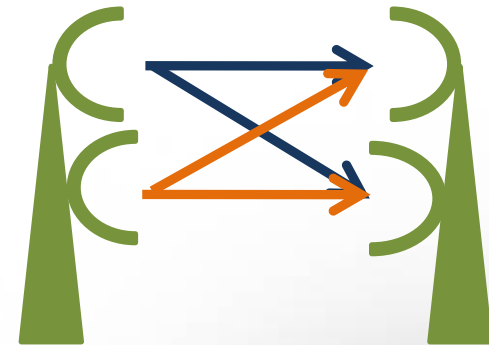
"TL" – Outstanding features

- Super high density packaging
- ACM (from 4QAM up to 256QAM) enable by SW
- High/Normal power amplifier by SW
- Transmit Power Control (ATPC/MTCP)
- XPIC with asynchronous processing technology
- Single (N+1) or mixed (N+0) rack configuration
- ACCP/ACAP/CCDP with:

SD (Space Diversity)

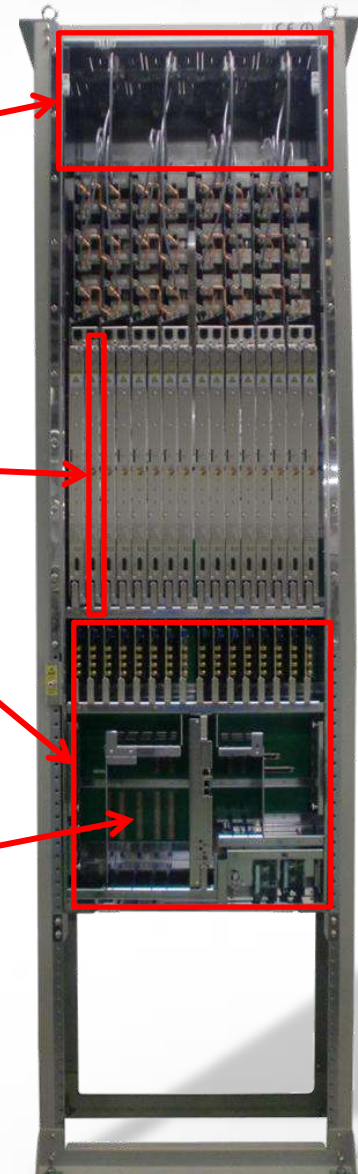


TSD (Transmit Space Diversity)

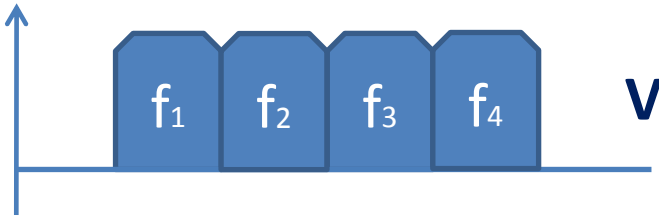


"TL" – Composition

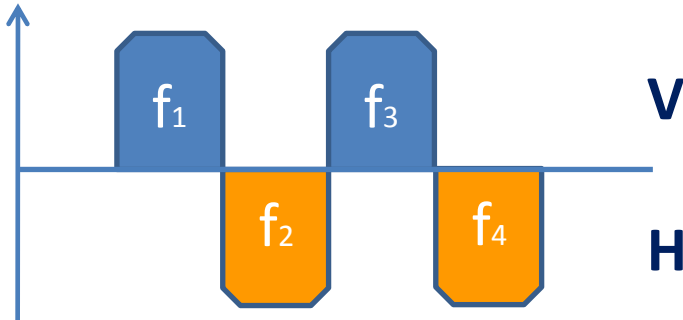
- Universal shelf for ALT/CCC/DT
- 8 Antenna ports
- Frequency Band diversity (N+1)(M+1)
- Up to 16 TRs per rack (TRMD card)
- SCSU – Supervision Control & Switching Unit:
 - ▶ SV supervisory unit
 - ▶ BSW: base band Switch unit for TRMD card switch
 - ▶ OCC INT (optional)
- BaseBand Interface:
 - ▶ STM-1
 - ▶ STM-4
 - ▶ GigaEth



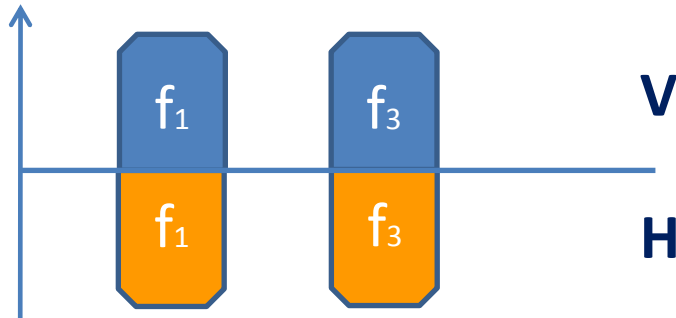
ACCP: Adjacent Channel Co-Polarized



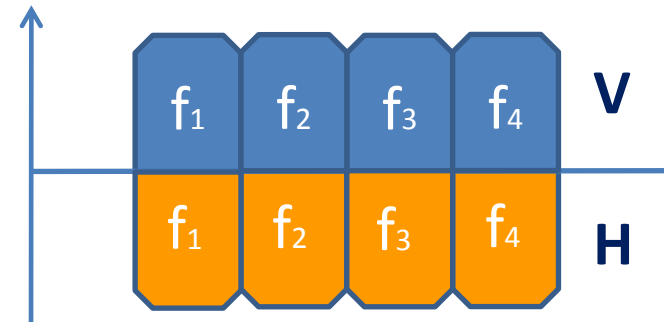
ACAP: Adjacent Channel Alternate Polarized



CCDP: Co-Channel Dual Polarized (+XPIC)



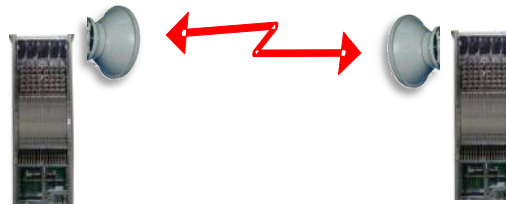
Mixed



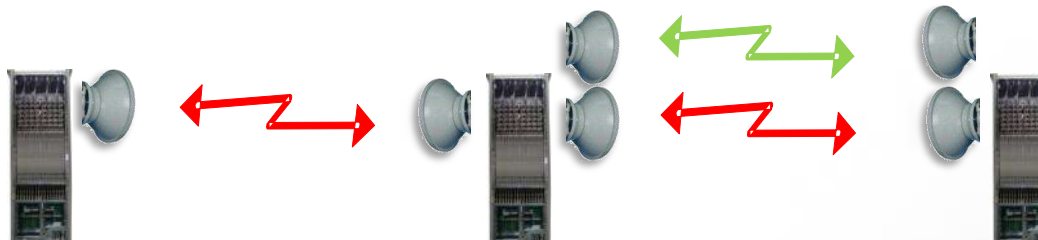
"TL" – Possible configurations

- ▶ N+1 or N+0 & M+1 or M+0 combined ACCP/ACAP/CCDP with/without SD/TSD (Maximum 16 systems with single/dual RF band, Point-to-Point Terminal)
- ▶ N+1 or N+0 & M+1 or M+0 combined ACCP/ACAP /CCDP with/without SD/TSD (Maximum 16 systems with single/dual RF band, Dual/Double Terminal)
- ▶ 1+1 Hot-Standby (two (2) systems per rack, Point-to-Point Terminal)
- ▶ 2-directional 1+1 Hot-Standby (four (4) systems per rack, Dual/Double Terminal)

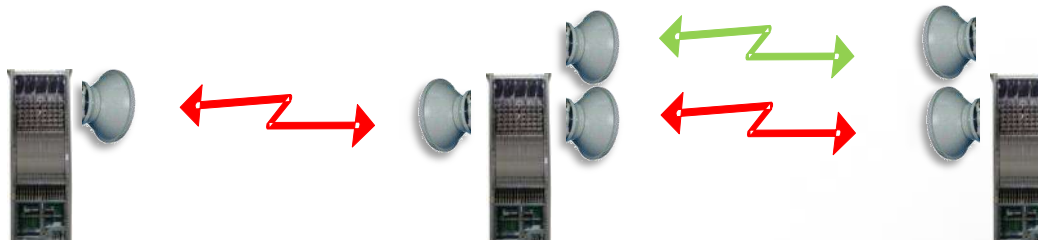
Point-to-Point Terminal & single RF



Dual / Double Terminal & single RF



Dual / Double Terminal & dual RF

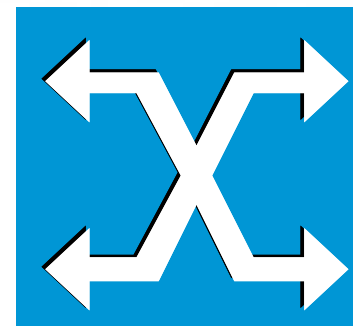


"TL" Trunk Link – Ethernet/IP features

- Ethernet/IP features:

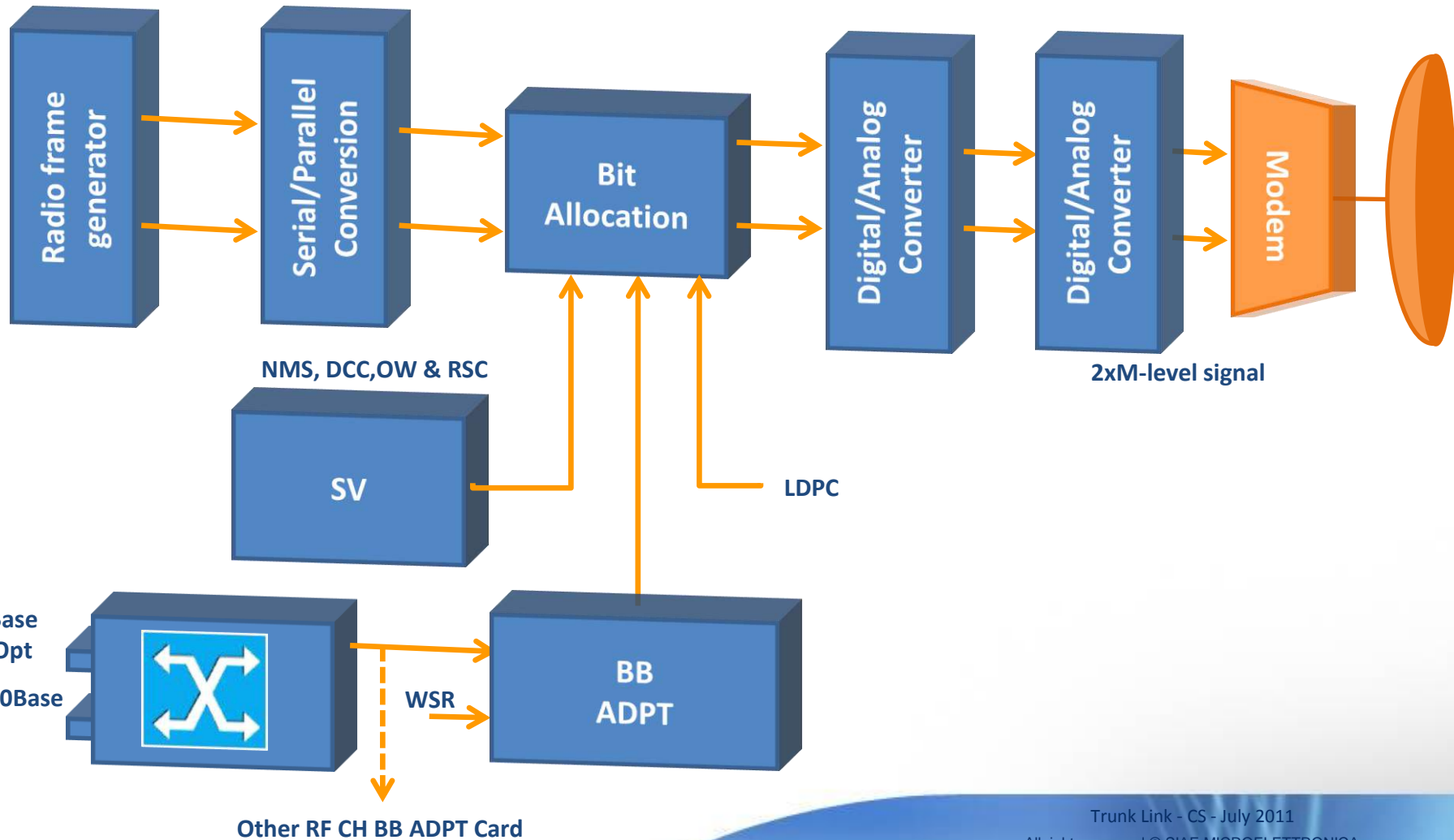
- ▶ GE SW card with integrated L2 SW
- ▶ Link Aggregation 802.3ad LACP (max 16 RF CH)
- ▶ Port based VLAN, Port based Priority
- ▶ Tag VLAN 802.1q; VLAN stacking QinQ Up to 4096 VLAN
- ▶ STP IEEE802.1d and RSTP IEEE802.1w

- ▶ QoS according to IEEE802.1pToS Type of Service/ DSCP
- ▶ Queue scheduling, strict priority and weighted priority
- ▶ Compression and accelerator (IFG and preamble suppression)
- ▶ Payload compression (payload header encoding)
- ▶ Synch Ethernet



"TL" – Native IP radio approach

TL Series transfer packets directly onto the radio link



"TL" – Ethernet throughput for ACM

Full duplex throughput ranging from 44 up to 204 Mbit/s

Item	Modulation	40MHz CS System	30MHz CS System
Throughput (*) / CH	4QAM	51 Mbps	44 Mbps
	16QAM	102 Mbps	87 Mbps
	32QAM	128 Mbps	109 Mbps
	64QAM	153 Mbps	131 Mbps
	128QAM	179 Mbps	153 Mbps
	256QAM	204 Mbps	175 Mbps

(*) Throughput means effective data speed excluding overhead bits

"TL" – Management Software

TL has an embedded SNMP agent and an HTTP web server

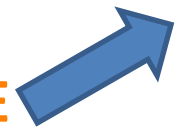
**LOCAL
MANAGEMENT**



**WEB
BROWSER**

**PC with MS Windows
HTTP embedded
No proprietary SW**

**CENTRAL/REMOTE
MANAGEMENT**



NMS5-LX

**PC with LINUX (SUSE)
Oracle Database**



NMS5-UX

**HP Server with HP-UX 11.x
Oracle Database**

NMS5-UX – TL radio systems Full Management

SDH N+1 Manager

TL 11
172.18.82.11
Connected

Space Diversity: Disable RF Band: USGI
Frequency: CoChannel Ne Mode: N x STM1 Regenerator Rs

0 Critical 4 Major 0 Minor 0 Warning 0 Active State

MSTU:	P B1	M1 B1	M2 B1	M3 B1	M4 B1	M5 B1	M6 B1	M7 B1	P B2	M1 B2	M2 B2	M3 B2	M4 B2	M5 B2	M6 B2	M7 B2
Main Antenna Rx Power:	-64	-63	-65	0	0	0	0	0	-43	-44	0	0	0	0	0	0
SD Antenna Rx Power:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tx Power:	16	17	17	0	0	0	0	0	17	17	0	0	0	0	0	0

BswMstuw.in

MSTU – BSW
BRU 2 – M1

MSTU State: In Service STM1 Line State: In Service
RSP1 State: In Service STM1 Radio State: In Service

Unit Alarm: Mon Op

Protection Switch Alarm: Mon Op

Service Channel Alarm

Single Alarm Details

"TL" Trunk Link IP / SDH Radio - Outstanding Features

EASY OPERATION & MAINTENANCE

- Reduced number of spare parts, achieved through extended frequency coverage of TRMD (ex MTSU)
- All BaseBand, IF (modem) , RF (RX & TX) circuits included in only 1 board : TRMD
→ High Integration, Enhanced Reliability, Easy Maintenance.
- WEB browser interface → Easy Maintenance.
- No external cabling necessary (MSTU with plug-in architecture)
→ Enhanced Reliability → Easy Maintenance.

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