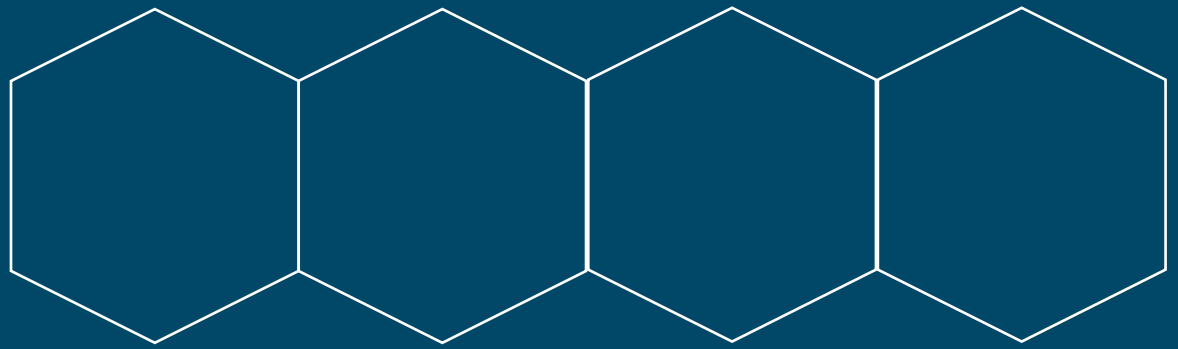
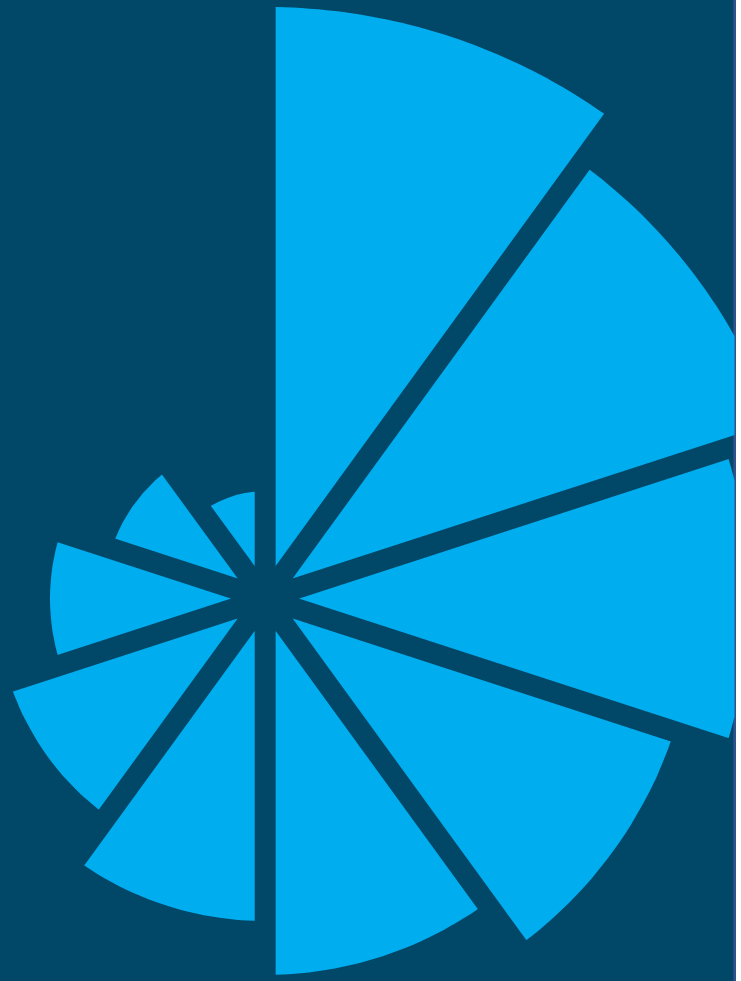
elenos group
DEDICATED RELIABLE CREATIVE

Elenos Group
World Broadcast



ELENOS BE itelco PRO TELEVISION

Introducing Itelco Products and the New Digital TV Gap Filler



Radio & TV
Broadcast Equipment
and solutions Worldwide

 | confidential | elenosgroup.com

Elenos Group

Elenos was founded in **1977** in Ferrara, Italy

- Focused on providing a wide rage of FM Transmitters, featuring the most compact and efficient products on the market
  (First in the world to provide a 10KW FM in 4U only)

Itelco Broadcast began in **1962** in Orvieto, Italy

- Specialized in digital modulation and high-power liquid-cooled systems
  (Supplier of CERN for High-power amplifier involved on the Large Hadron Collider)

BE was established in Quincy, Illinois in **1959**,

- Broadcast Electronics has an illustrious history that has played an influential role in many radio milestones
  BE offers a wide range of high quality radio broadcast products, including automation software, transmitters for AM, FM and HD Radio and Marti Electronics.

PROTELEVISION TECNOLOGIES established in Denmark, over 50 years of experience,

- Broadcast formerly Philips TV & Test Equipment, is a leading designer and manufacturer of advanced future-proof modulation solutions for Digital TV and Radio standards (DVB-T/T2, ISDB-T, DAB+, ATSC 1.0 and ATSC 3.0) represented worldwide in more than 50 countries with over 30,000 installed units in daily operation.

Today

The mission of the **Elenos group**, by utilizing its state-of-the-art production capabilities and international sales network, is to provide consumers with the best radio and TV broadcasting experience for all global modulation standards.

With over 90 years of experience in the field, the Elenos group has developed technologies for Network applications, Digital and Analog TV / FM Radio Systems, scientific RF applications and remote software control and management.

The Elenos group is an ideal partner in helping develop your networks for your next digital migration.

elenos group
DEDICATED RELIABLE CREATIVE

60.000 Installations
130 Countries
90 Years of Experience

More than 20 Centers of **EXCELLENCE**

- **Radiocomm**
- **LEGA** Ltd
- **Clyde** Broadcast Products Ltd
- **Broadcast Partners**
- **FPG SERVIS** s.r.o.
- **Nagyfrekvencia** Kft
- **RTV-TEC**
- **Roussillon** FM
- **SiteMaster** LDA
- **Matel** Elettronica Snc
- **RS** Telekomunikasyon
- **Athenas** Comunicaciòn y Logistica SL
- **Shanghai** Yi Hui Nuo Broadcast
- **PT. Solitech** multi-media & broadcast sol.
- **Vtek** Engineering Ltd
- **Headway** High Tech
- **BTSi**
- **Broadcast Solution** International Ltd
- **Cakrawala** Gemilang
- **Ponto de Apoio Tecnico** Eletronico LTDA
- **Vec** SrL

Some of our customers in Far East

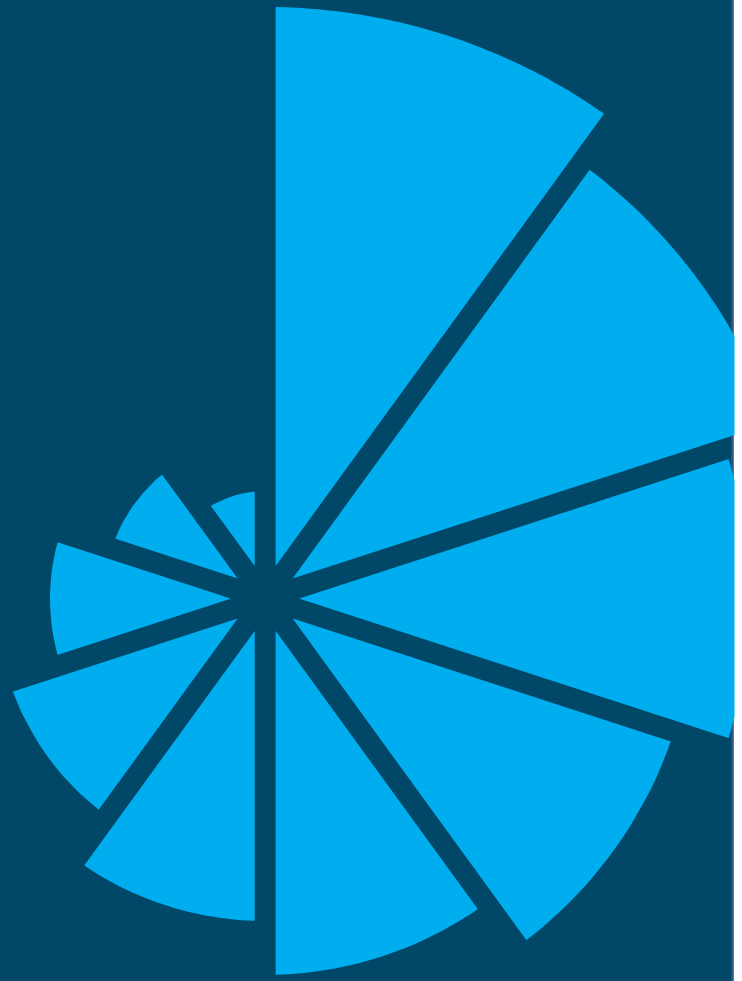
- Audio Visual communicators Inc.
- Allawan Enginneering
- Aliw Broadcasting
- Baganian Broadcastind Corp
- Brigada News FM
- Brigada Mass Media Corp
- Cristian Music Power
- Capitol Broadcasting Center
- DXKB 89,1
- DXJM FM
- DJIB 96,1 FM Municipality Pamploma
- Efren Tenizo
- First United Broadcasting
- UM Broadcasting Network
- Insular Broadcasting
- Radio Mindanao
- Southern Broadcasting Network
- Primax Broadcating
- Radio Corporation Philippines
- Ramil Uy
- RMC Broadcast Corporation
- RT Broadcast Specialists

elenos group
DEDICATED RELIABLE CREATIVE

Elenos Group
World Broadcast

itelco

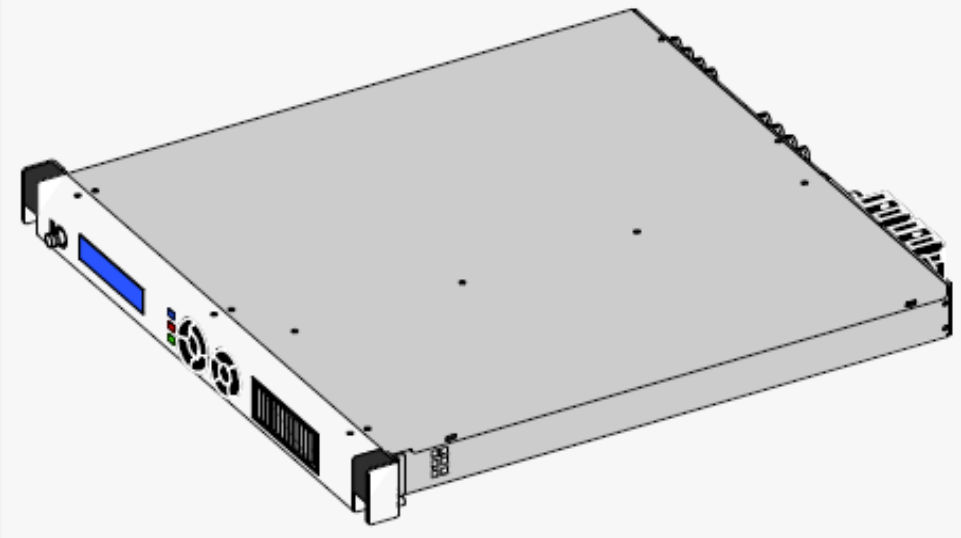
ELENOS BE itelco PRO TELEVISION



Radio & TV
Broadcast Equipment
and solutions Worldwide

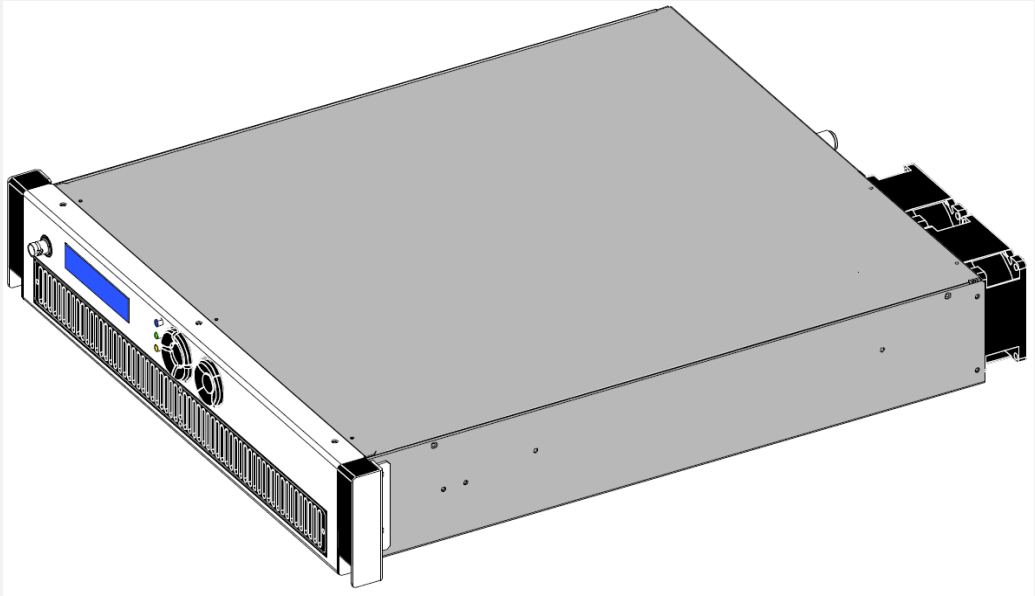
 | confidential | elenosgroup.com

MEX II - 1Wrms, 10Wrms, 25W rms
Low power multimode
Exciter / Transmitter / Transposer / Gap-filler



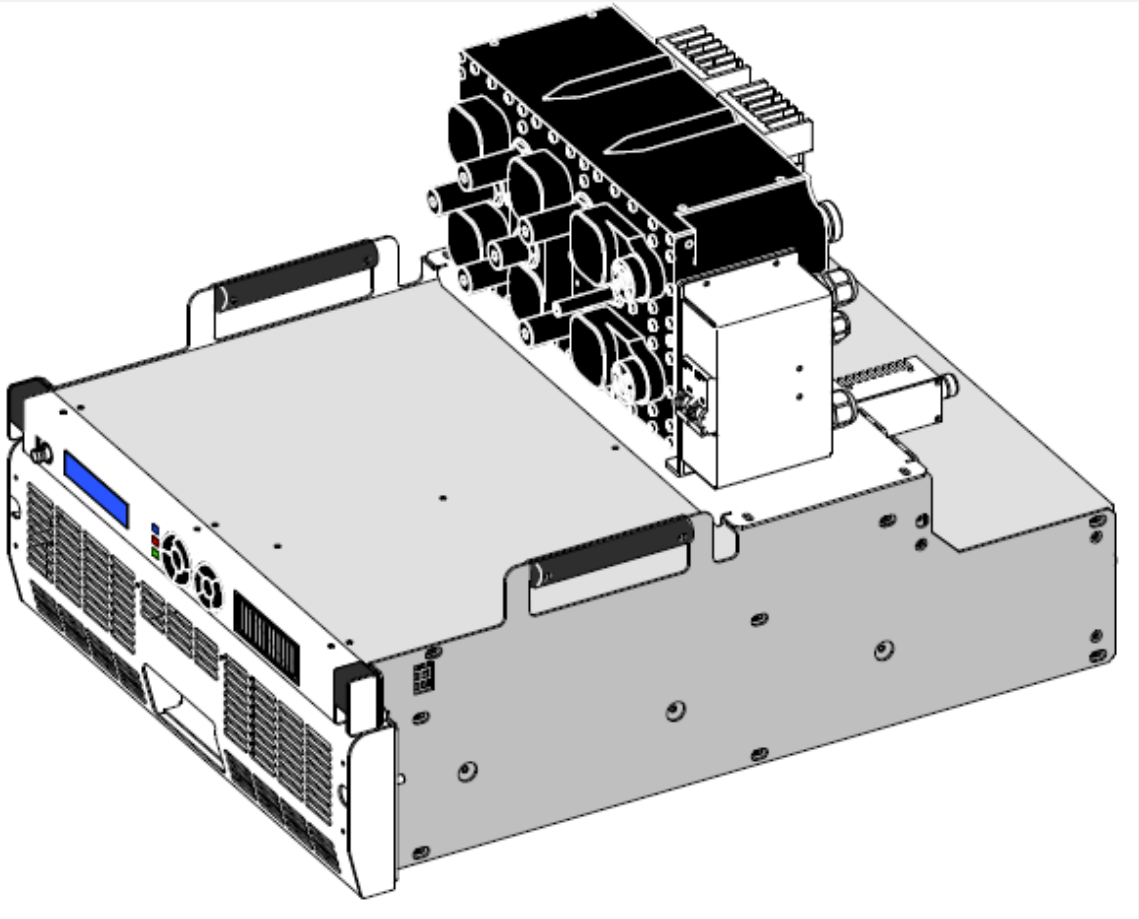
New 1 RU Design with Optional Receiver Model For
Gap-filler and Transposer applications

IEC 100 - 100W rms
Low power multimode
Exciter / Transmitter / Transposer / Gap-filler



New 2 RU Design with Optional Receiver Model For
Gap-filler and Transposer applications

Alpan - Medium power multimode Transmitters



HPAs number	
ALPAN 200	DVB-T/H
	DVB-T2
	ISDB-T/T_b
	ATSC
	ANALOG
ALPAN 400	DVB-T/H
	DVB-T2
	ISDB-T/T_b
	ATSC
	ANALOG
ALPAN 600	DVB-T/H
	DVB-T2
	ISDB-T/T_b
	ATSC
	ANALOG

elenos group
DEDICATED RELIABLE CREATIVE

Thalna

Air
Cooled Transmitters
Power Amplifiers

UHF 1HPA	UHF 2HPA	UHF 3HPA	UHF 4HPA	UHF 5HPA	UHF 6HPA	UHF 8HPA
700W avg	1,5kW avg	2,2kW avg	2,8kW avg	3,5kW avg	4,2kW avg	5,6kW avg
1,2kW p.s.	2,4kW p.s.	3,6kW p.s.	4,8kW p.s.	6kW p.s.	7,2kW p.s.	8,4kW p.s.

Thalna

Air Cooled Transmitters
Power Amplifiers

- MULTISTANDARD OPERATION
- Available for VHF and UHF
- Full Broadband Doherty
- HIGH EFFICENCY RF UP TO 37%
- Modular Hot Plug modules
- FULL REDUNDANCY RF and PS STAGE
- Adaptive precorrection for maximum optimization of transmitter transmission performances and power efficiency

Northia

Liquid Cooled Transmitters
Power Amplifiers

UHF 1HPA	UHF 2HPA	UHF 3HPA	UHF 4HPA	UHF 5HPA	UHF 6HPA
1,5kW avg	3kW avg	4,5kW avg	6kW avg	7,5kW avg	9kW avg
4kW p.s.	8kW p.s.	12kW p.s.	16kW p.s.	20kW p.s.	24kW p.s.

elenos group
DEDICATED RELIABLE CREATIVE

TV Transmitters Redundancy

UHF 16HPA
24kW avg
64kW p.s.

Itelco Broadcast

- CCU (Central Control Unit) common to all power classes
- Graphical User Interface with color touchscreen
- User definable configuration, up to 8 main transmitters
- Integrated coax switches up to 100Wrms (4+1 max)
- Interface for external coax switches

ELENOS BE itelco PRO TELEVISION

Northia

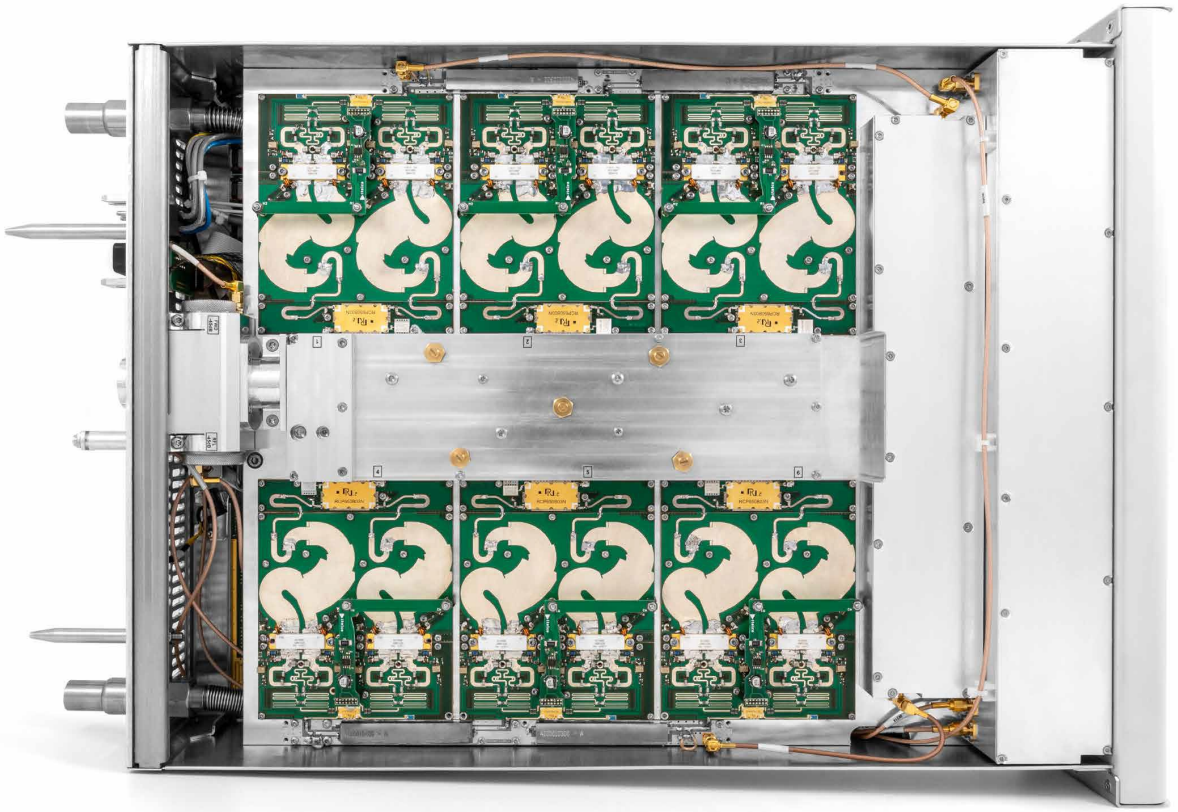
Liquid Cooled Transmitters
Power Amplifiers

- High Efficiency and redundant Liquid cooling system
- Available for VHF and UHF
- Full Broadband Doherty HIGH EFFICENCY RF UP TO 37%
- Modular Hot Plug modules
- Open and Closed Circuit

Northia

Liquid Cooled Transmitters Power Amplifiers Doherty technology

- High Efficiency and redundant Liquid cooling system
- Available for VHF and UHF
- Full Broadband Doherty HIGH EFFICENCY RF up to 37%
- Modular Hot Plug modules
- Open and Closed Circuit



- The same RF pallet is used in the **Thalna Line** air coole transmitters in which each power amplifier drawer has (three) RF pallet each one

MEX II and IEC 100

Low power multimode

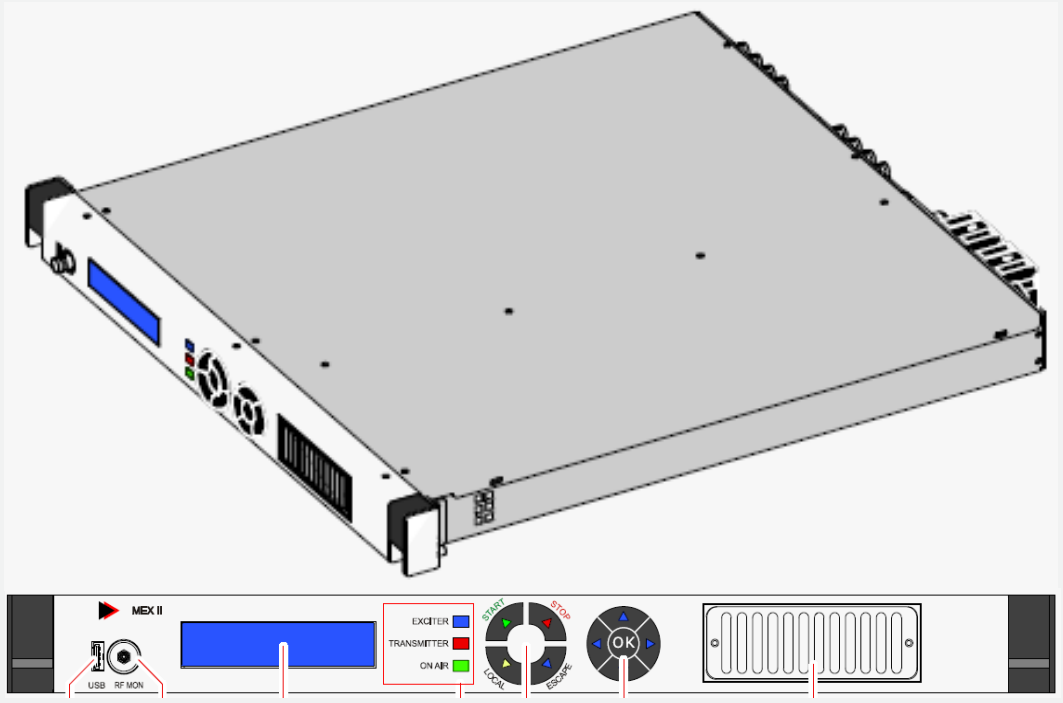
Exciters / Transmitters / Transposers / Gap-fillers

- MEX II – 1Wrms, 10Wrms, 25W rms
- IEC 100 – 100W rms

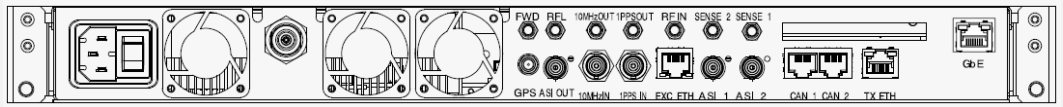
Multimode = Same hardware with different firmware for:

DVB-T / DVB-T2 / ISDB-Tb / ATSC / DAB / DMB

MEX II - 1Wrms, 10Wrms, 25W rms - Low power Exciter / Gap-filler

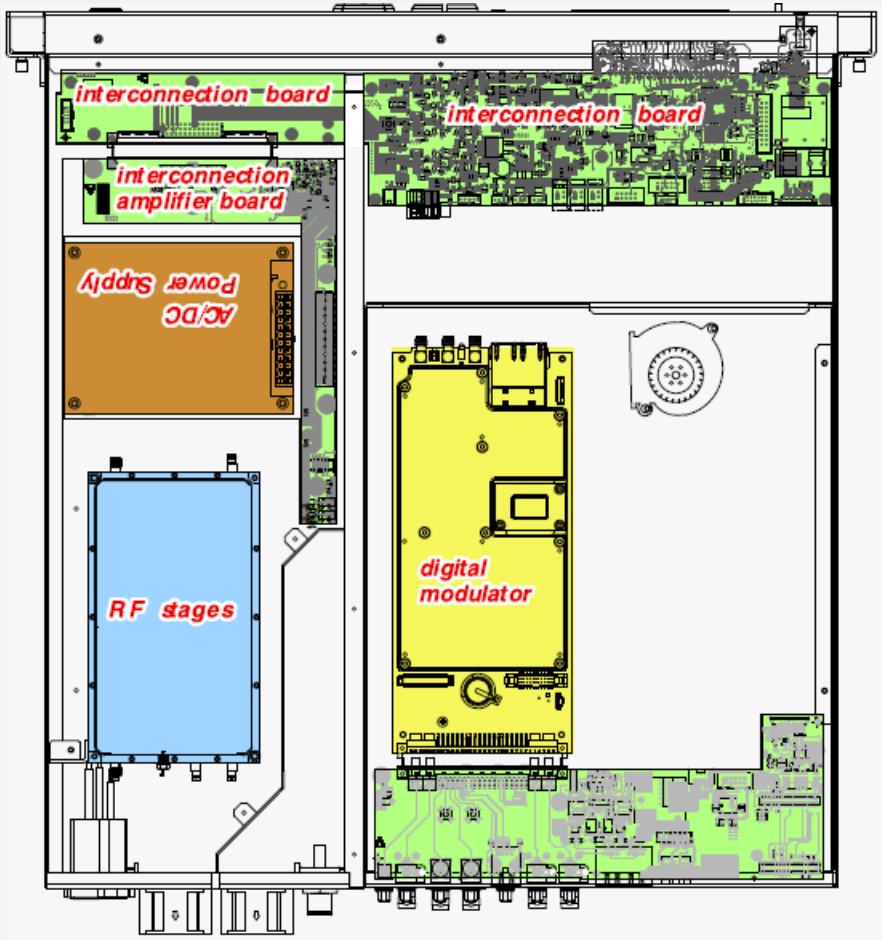


front view

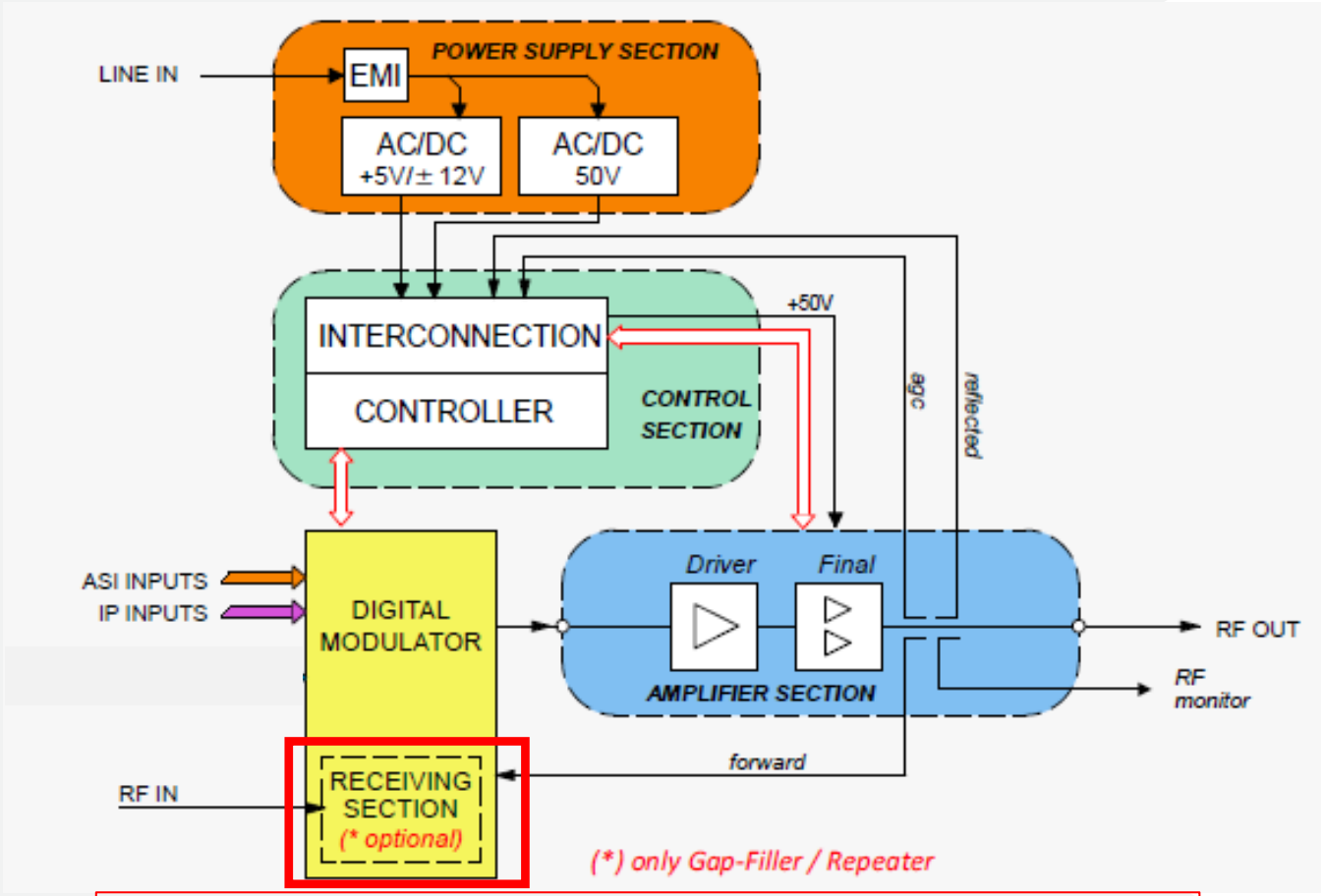


rear view

MEX II



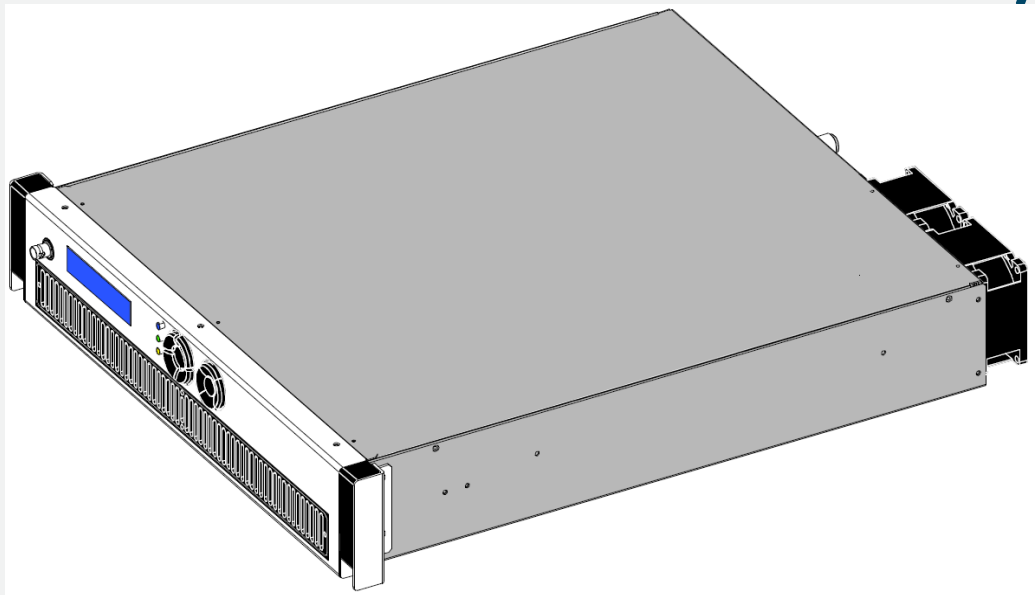
top view



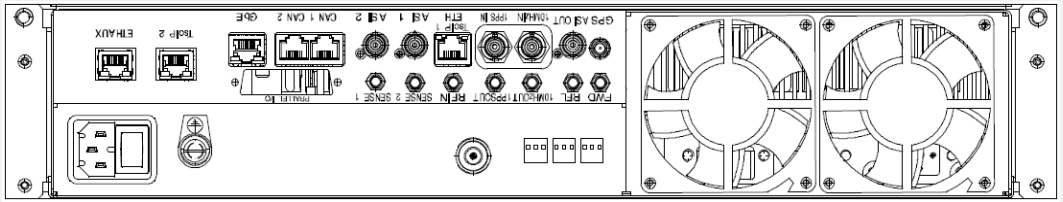
This down converter additional board transform the Exciter into a transposer / gap-filler

block diagram

IEC 100 – 100W rms – Exciter / Gap - Filler

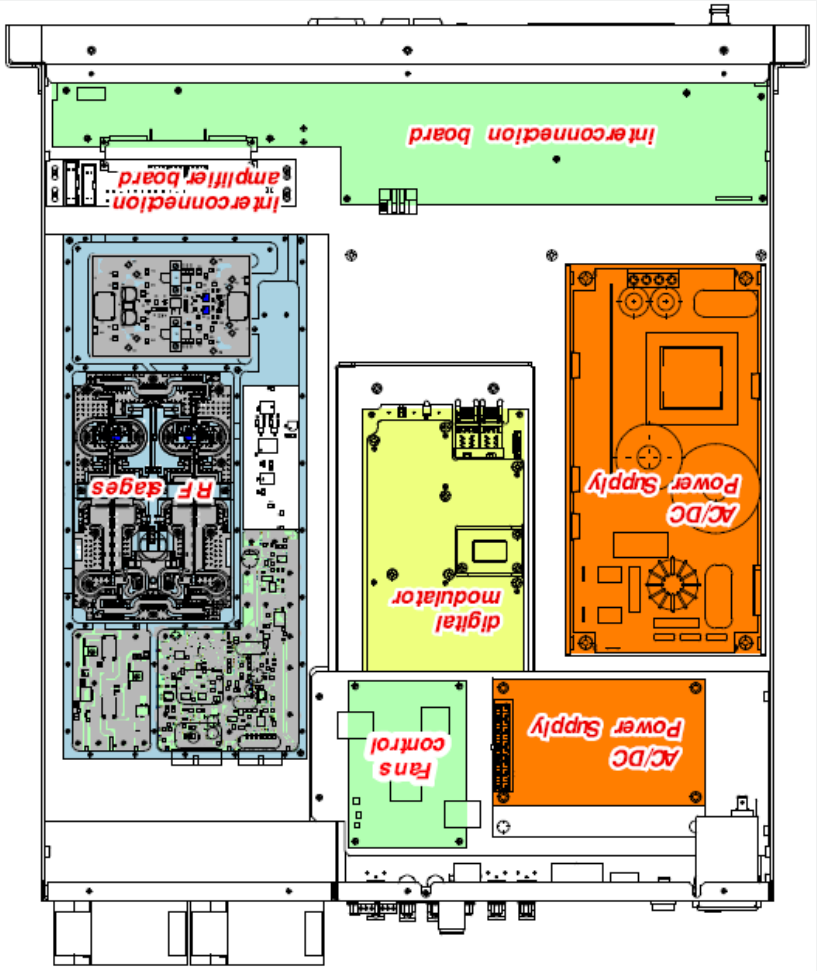


front view

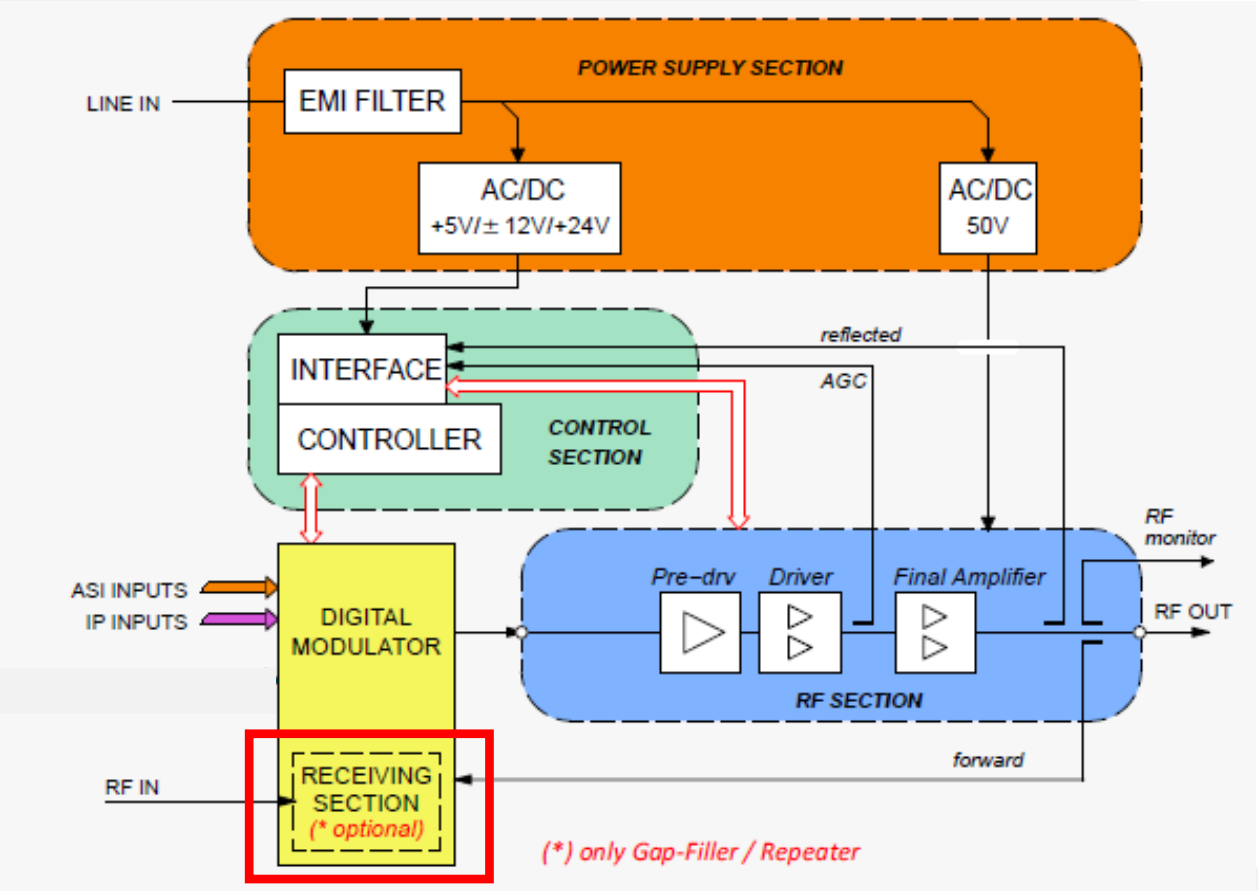


rear view

IEC 100



top view

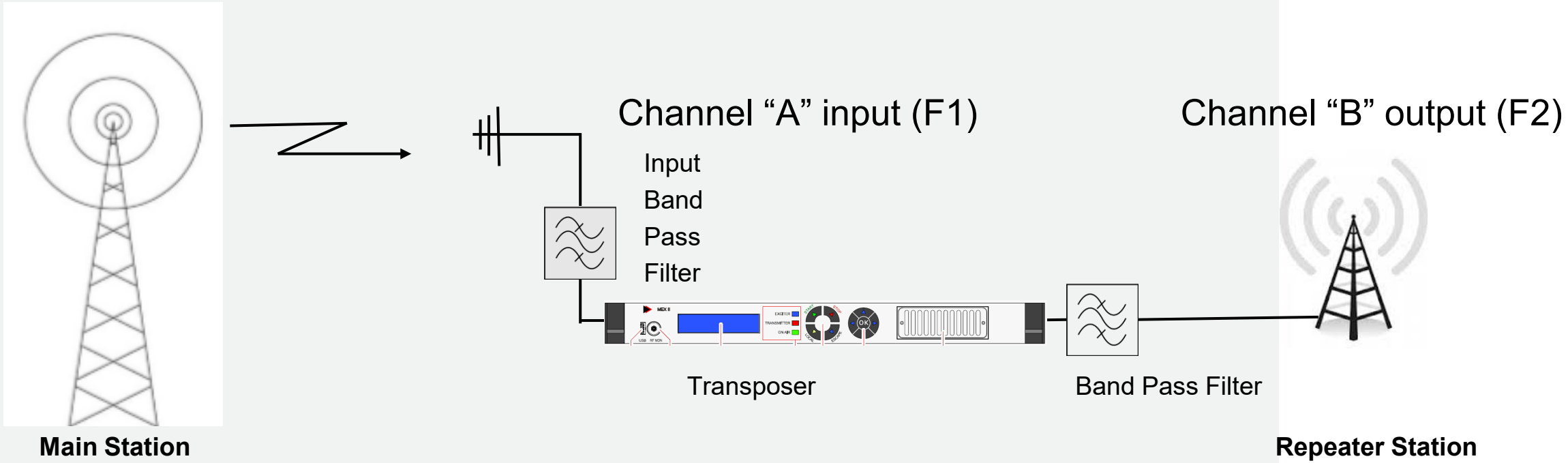


This down converter additional board transform the Exciter into a transposer / gap-filler

block diagram

Intuitive and user friendly WEB Graphical User Interface

What is a Transposer or Translator



Transposer receives an RF channel, Frequency “A” and retransmits on another channel, Frequency “B”

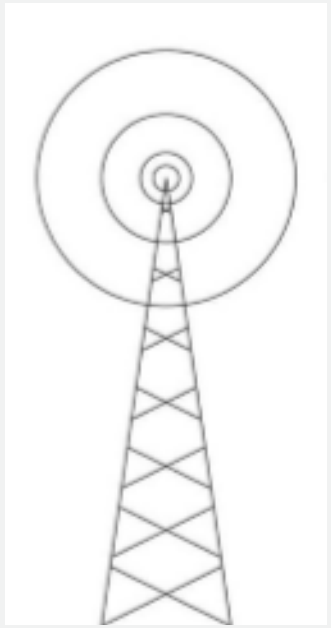
Transposer or Translator

A Transposer receives an RF channel, “A” and retransmits on another channel, “B”

- It’s the most convenient and practical method of filling gaps, but you need a new channel that may not be available
- It’s the easiest solution because it doesn’t need:
  - Isolation between TX and RX antennas
  - Synchronization
  - Echo Cancelling
- More over it offers:
  - Easy installation
  - Less interferences planning
  - Best Signal to noise ratio and shoulders

If we do not have another available channel the solution is in the next page

What is a Gap-filler



Main Station

Channel “A” input

- RF Input with high dynamic range; Input band pass filter needed only in some case
- RF input level measure available via web SNMP
- RF digital filters bandwidth selectable

On frequency repeater

Band Pass Filter

Channel “A” output

Repeater Station

A Gap-filler receives an RF channel, “A” and retransmits it on the same channel

Gap-filler or On frequency repeater in SFN

Gap-filler or On frequency repeater receives an RF channel, “A” and retransmits it on same “A” channel

- Optimization of the use of the spectrum frequency allowing growth for TV channels
- Uniform coverage and distribution
- Increasing of system availability and reliability
- Presence of multiple transmission points

Mandatory conditions to implement an SFN Network

- Transmitter synchronization
- Same transmission frequency at the same time
- Same mapped BTS no rearrangements allowed

Gap-filler or On frequency repeater in SFN

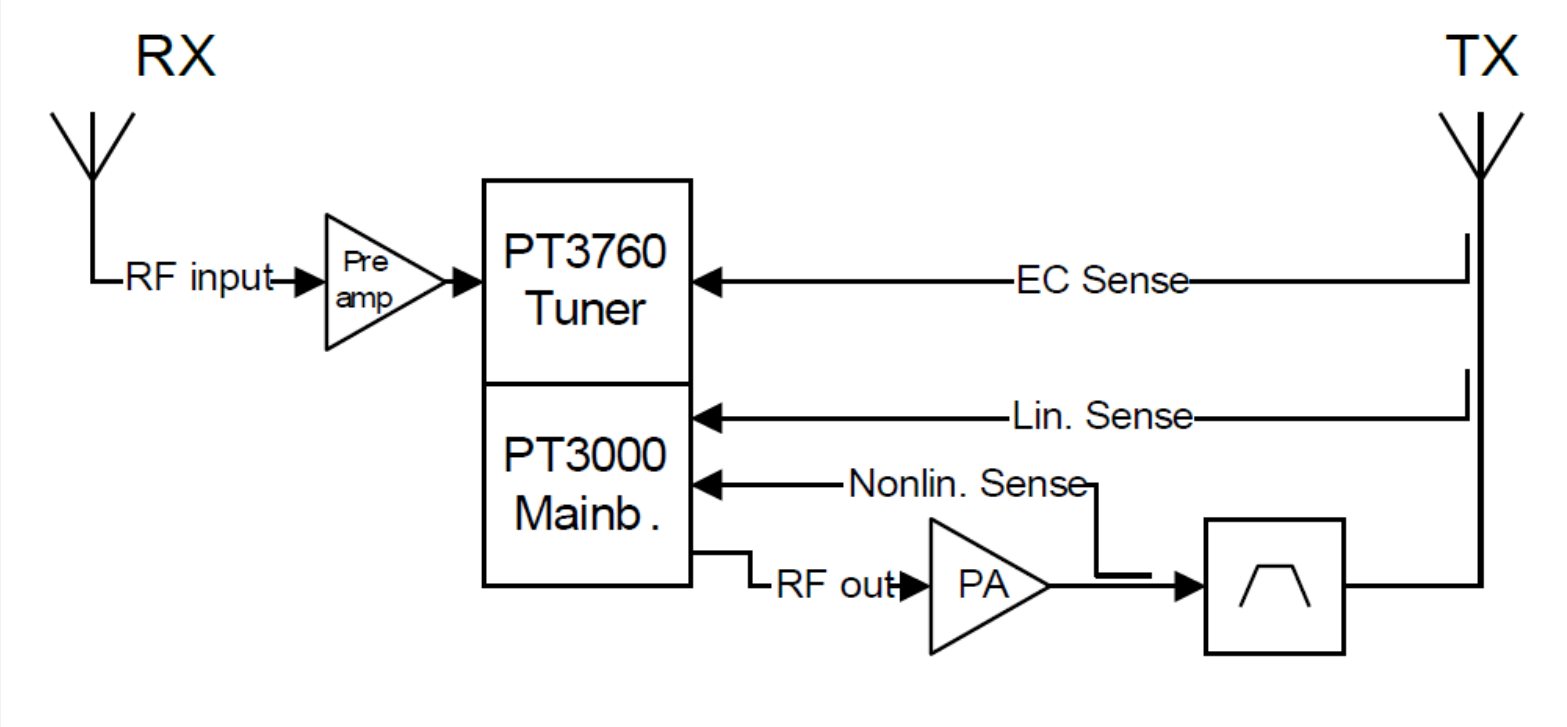
Disadvantages

- Transmitted power is limited by the “echo”
- Quality of transmitted signal can be easily deteriorated by other transmitters
- A good isolation between transmitting and receiving antennas is required

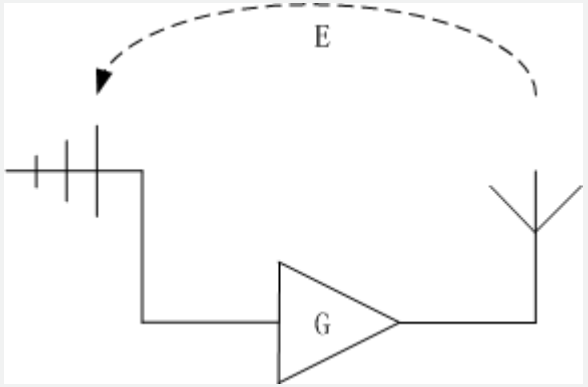
Advantages

- Easy installation and lower cost
- GPS Synchronization is not required
- It doesn’t require an additional transmit network

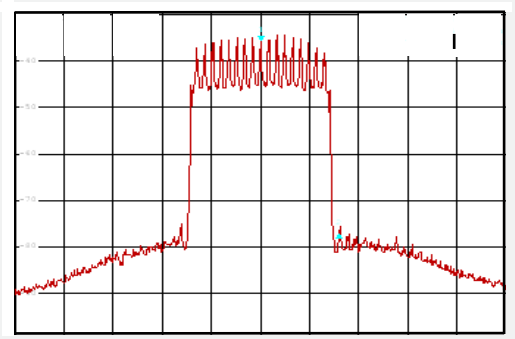
Gap-filler repeater block diagram



Concept of a signal “Echo”



Where the Echo is generated?

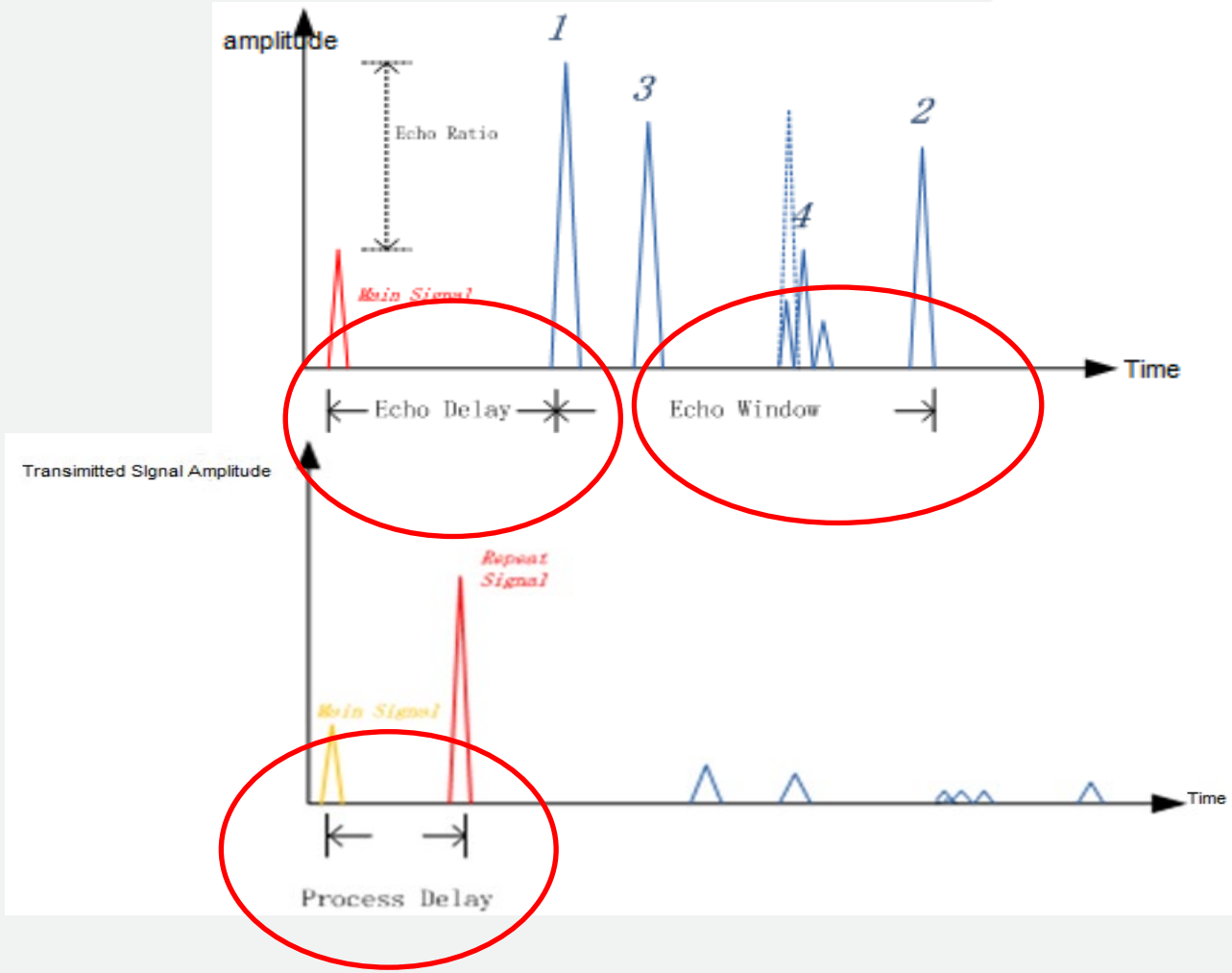


How the Echo is visible on the spectrum

Concept of Echo Cancellation

- Echo Delay: The delay between the Echo and received signal
- Echo Window: Length of the Echo channel impulse response
- Process Delay: The delay of echo cancellation process
- The E.C. window can be adjusted to be either 7 or 14 uSec (the echo canceller will cancel multiple echos as long as they fall within the window)

The Gap-filler system gain is limited to the Isolation between the receiving and the transmitting antenna

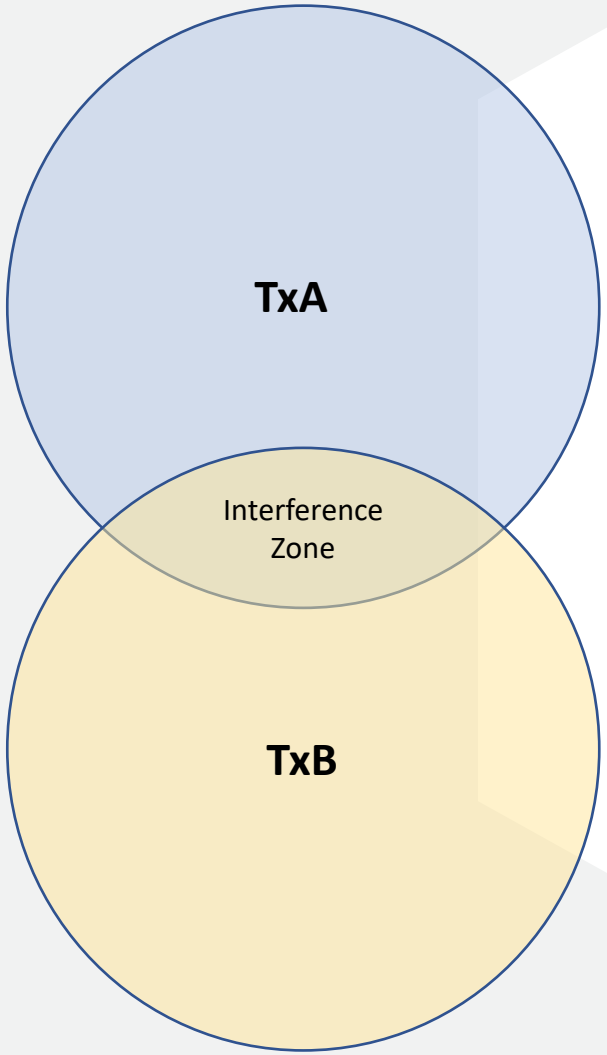


How to increase antenna isolation

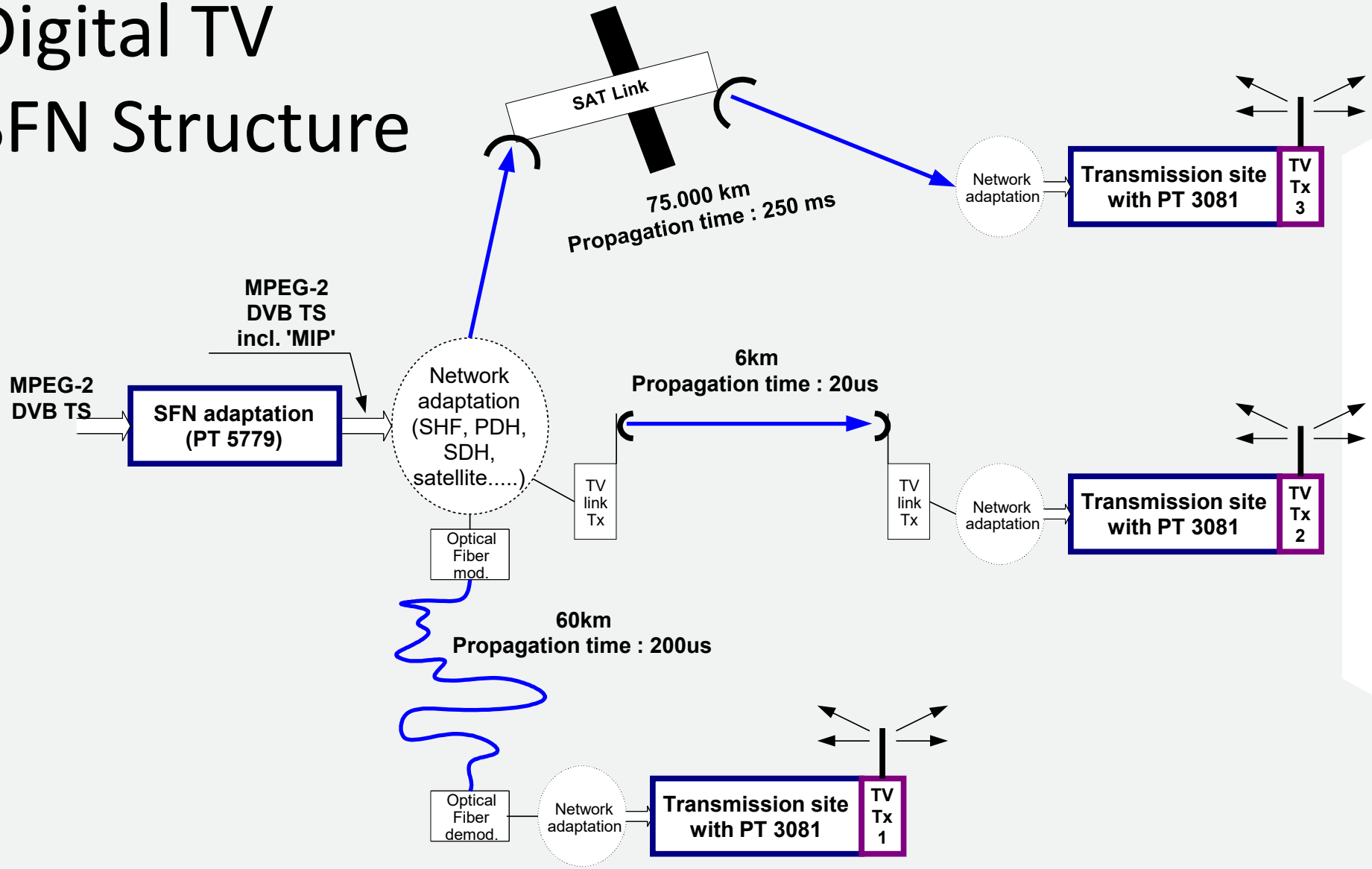
To get higher GAP Filler power, the antenna isolation has to be increased over 100dB in some transmitting sites. This is very difficult or even impossible. Application needs to be carefully evaluated and planned.

SFN Basics

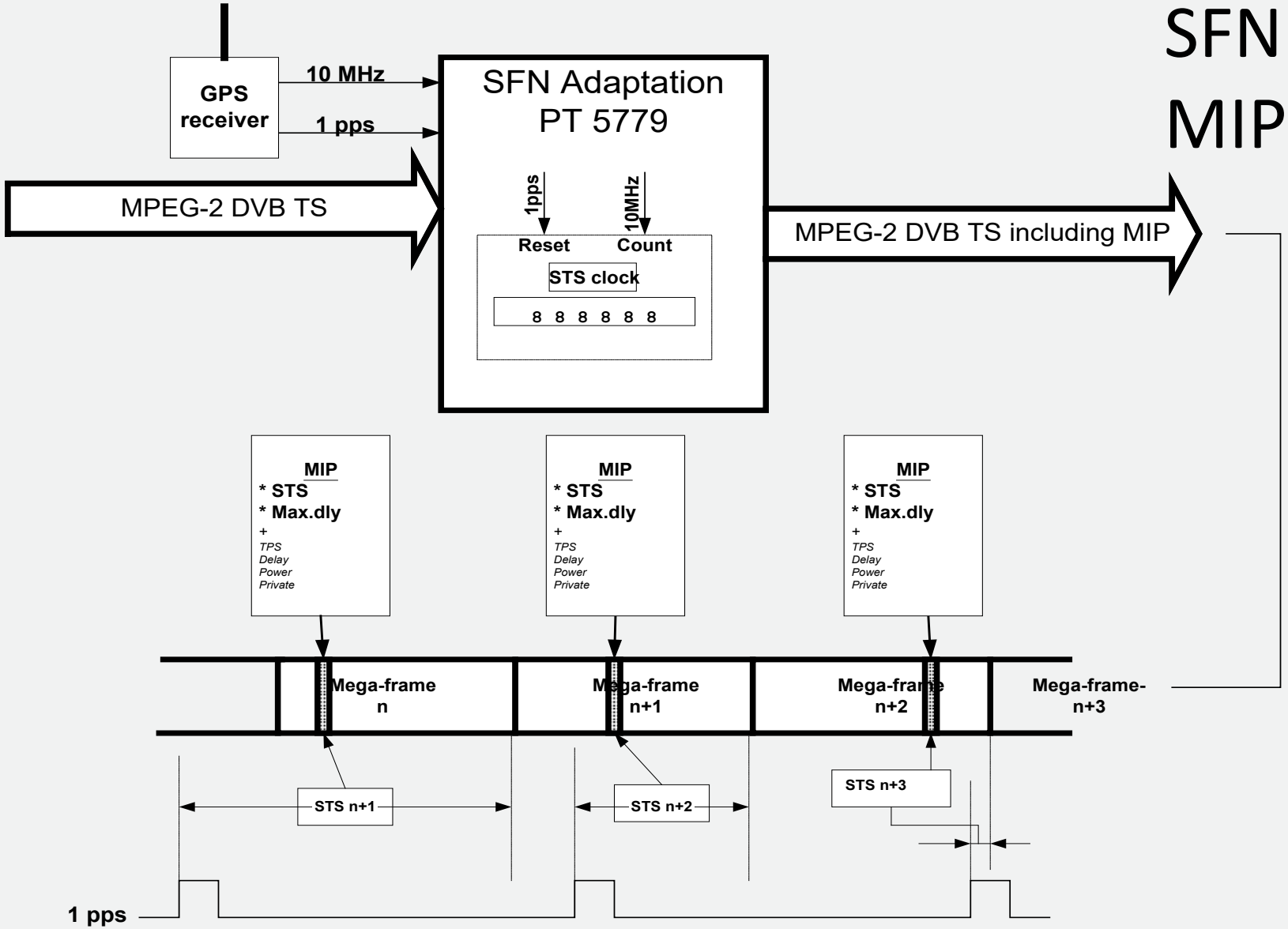
- SFN is a “Single Frequency Network”
- It allows continuous coverage from one transmitter area to another, and makes more efficient use of spectrum.
- SFN requires careful coverage planning, and precise timing.
- For digital TV and DAB, a “guard interval is used, but this is not possible for analog.
- This means analog SFNs are actually more difficult than digital. D/U ratios of 4dB or worse constitute the Interference Zone.



Digital TV SFN Structure



SFN Adaptation MIP insertion



c/training/sfn/sfn timing-2.vsd hso/sal 000508

MEX II IEC 100

RF PARAMETERS

RF INPUT	
Frequency range	30–1000MHz (1 Hz resolution)
Connector/Impedance	SMA female/50Ω
Return Loss	> 16 dB
Input Level	30–100 dμBV (from −77 dBm to −7 dBm)
Input Noise Figure	< 8 dB @gain max. (typical 6.5 dB)
Immunity to other channels • adj. ch N ± 1 analog signal sync/OFDM • digital signal OFDM/OFDM • other ch.: analog signal sync/OFDMOFDM • analog signal OFDM/OFDM	 > 40 dB (*) > 30 dB (*) > 46 dB (*) > 40 dB (*)
	(*) *measured as threshold for QEF reception, mode=8K, 64QAM,CR2/3*
Selectivity	> 65 dB attenuation outside f_0 ± 4.2 Mhz (*dipending on selectivity−filter choice*)

Input−to−output performances

MER degardation vs. RF input level and loop gain (typical measurement @474Mhz)

Loop gain 0 dB (no Echo) − Echo Canceller active

RF input level	MER @ RF input	MER @ RF output
−27 dBm	46.3 dB	42.6 dB
−37 dBm	45.1 dB	42.6 dB
−47 dBm	39.6 dB	42.6 dB
−57 dBm	39.6 dB	39.9 dB
−67 dBm	34.0 dB	32.3 dB
−72 dBm	29.0 dB	27.3 dB

Loop gain 5 dB (Echo 5 dB above wanted signal) − Echo Canceller active

RF input level	MER @ RF input	MER @ RF output
−27 dBm	46.3 dB	40.5 dB
−37 dBm	45.1 dB	40.6 dB
−47 dBm	39.6 dB	40.4 dB
−57 dBm	39.6 dB	38.8 dB
−67 dBm	34.0 dB	32.0 dB
−72 dBm	29.0 dB	27.1 dB

Our network of dealers are supported by our field engineering team World - Wide.

Thank You and mail us for info

elenos group
DEDICATED RELIABLE CREATIVE

Radio & TV
Broadcast Equipment
and solutions Worldwide

Elenos
Headquarters:

44028 Via Amendola 9 - Poggio Renatico FE Italy Telephone
+39 0532 82 99 65 –
Fax +39 0532 82 91 77

www.elenos.com - info@elenos.com

Broadcast Electronics
Headquarters:

4100 North 24th Street Quincy, IL 62305
Phone: (217)-224-9600
Fax: (217)-224-9607

www.be.22hbg.com - bdcast@bdcast.com

Itelco
Headquarters:

05018 Via Dell'Innovazione 2 - Orvieto TR
Italy Telephone +39 0763 96 03 00 –
Fax +39 0763 34 18 10

www.itelco.tv/ - info@itelco-electrosys.com

ProTelevision
Headquarters:

Valhøjs Allé 176, 1st floor - DK-2610
Rødovre
- Denmark Telephone: +45 44700000

www.protelevision.com - sales@ProTelevision.com