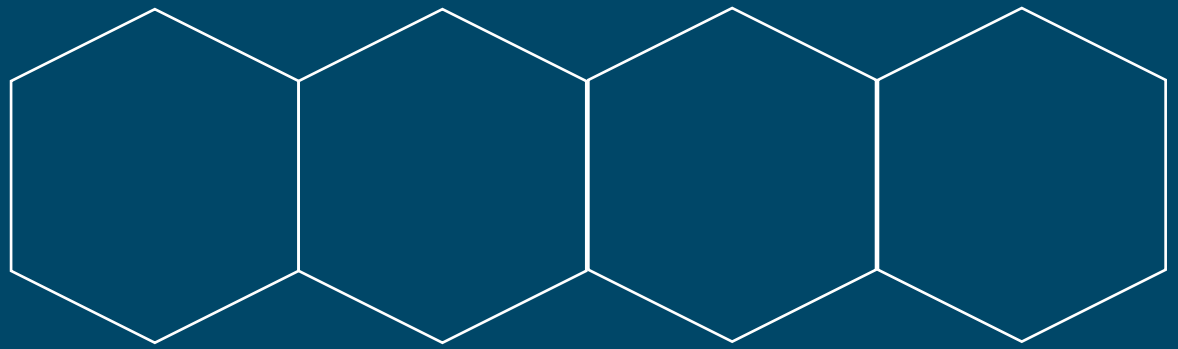
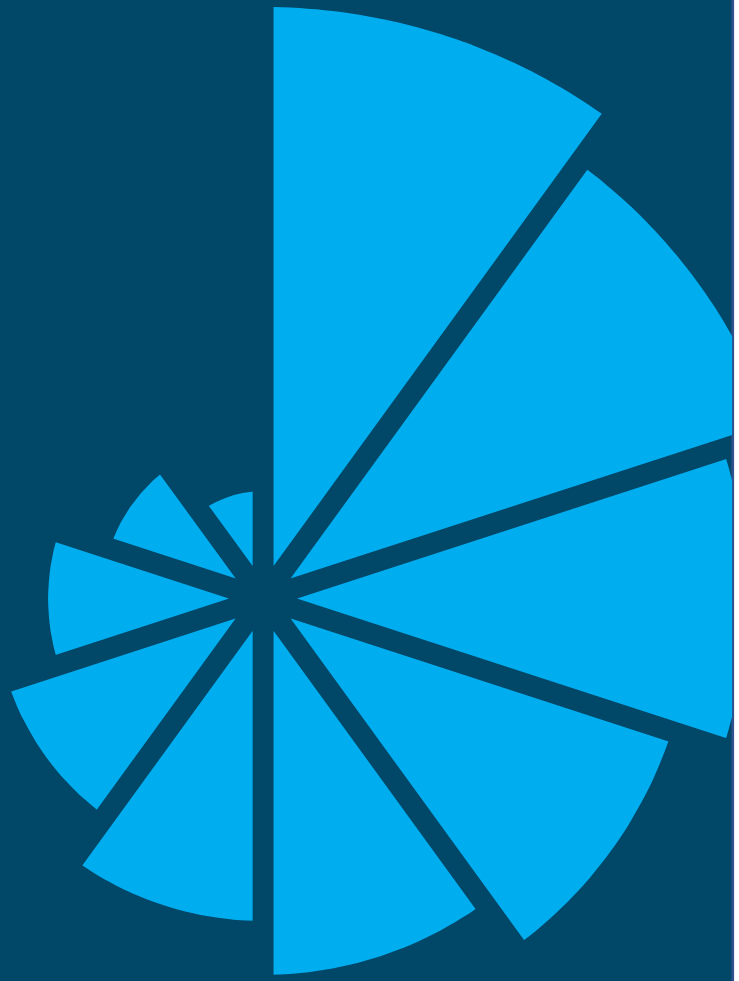
elenos group
DEDICATED RELIABLE CREATIVE

Elenos Group
World Broadcast



ELENOS BE itelco PRO TELEVISION

Introducing Itelco Low power transmitters



Radio & TV
Broadcast Equipment
and solutions Worldwide

 | confidential | elenosgroup.com

Elenos Group - History

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

BE

itelco

PRO TELEVISION

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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 ASIA

- 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

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Elenos Group
World Broadcast

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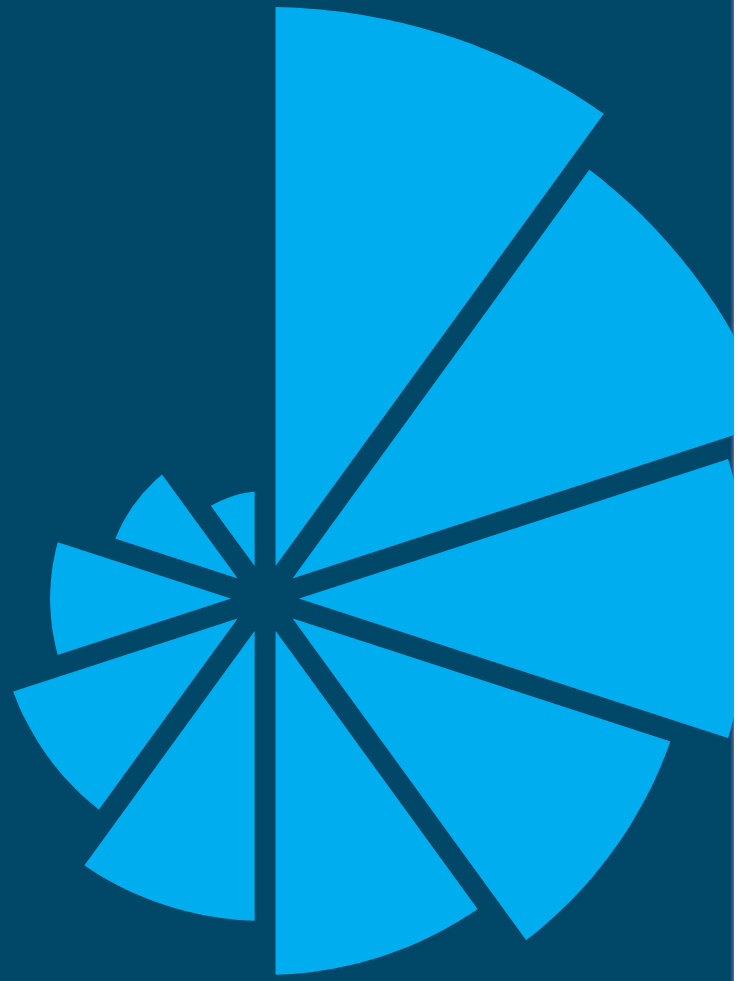
Introducing Itelco Low and Medium power transmitters



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MEX II - IEC 100

Multimode = Same hardware with different firmware for:

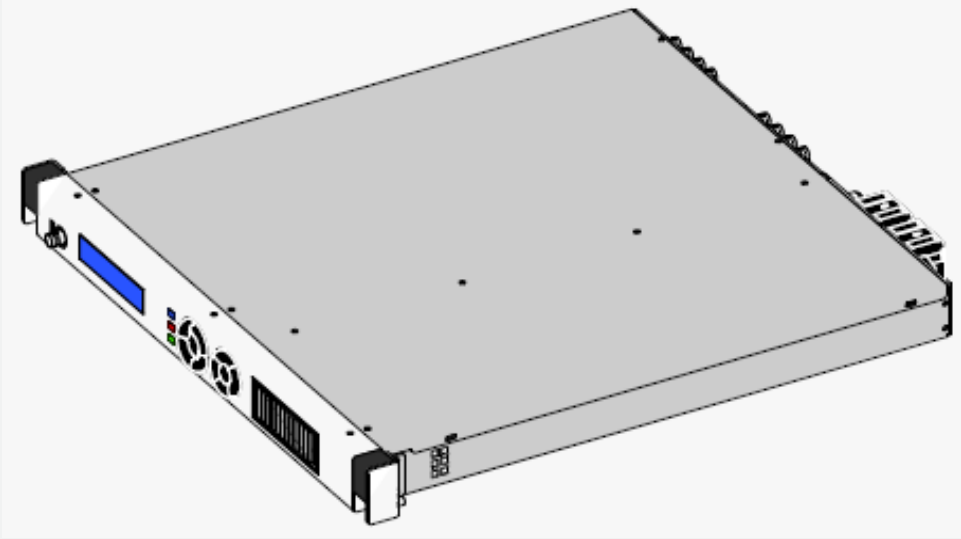
- DVB-T
- DVB-T2
- ISDB-Tb
- ATSC
- ATSC3
- DAB /
- DMB

Low power:

Exciters / Stand-alone Transmitters

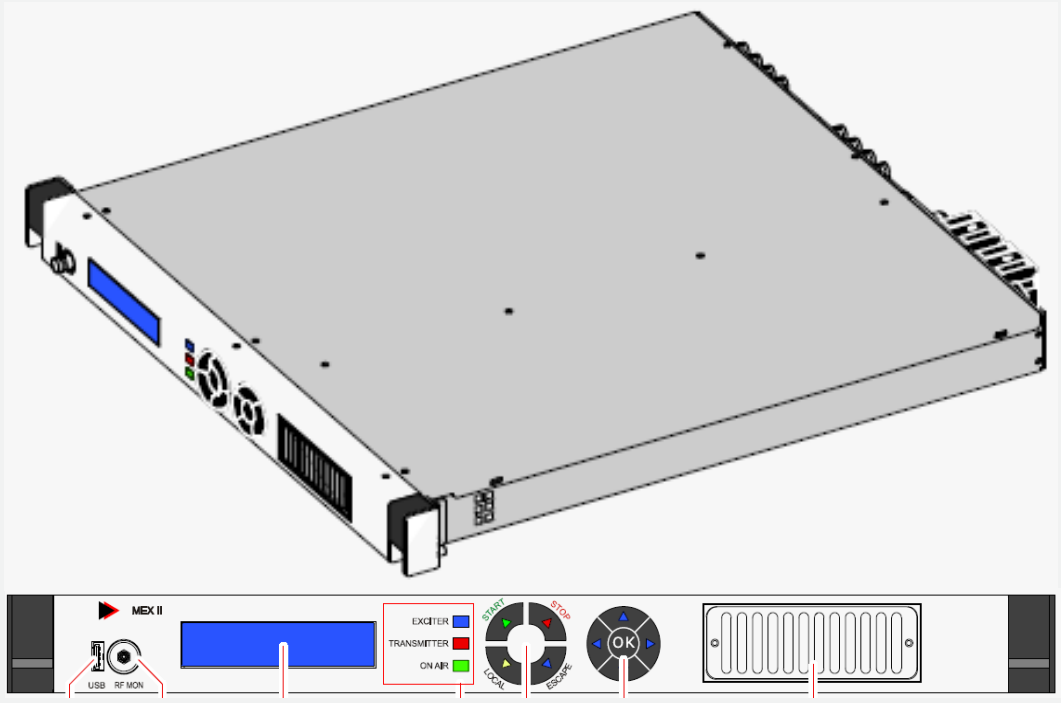
- MEX II – 1Wrms, 10Wrms, 25W rms
- IEC 100 – 100W rms

MEX II - 1Wrms, 10Wrms, 25W rms Low power multimode Exciter / Stand-alone Transmitter

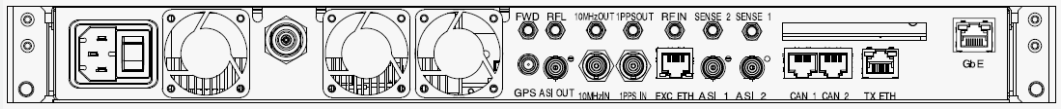


New 1 RU Design with Optional built-in Satellite Receiver

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

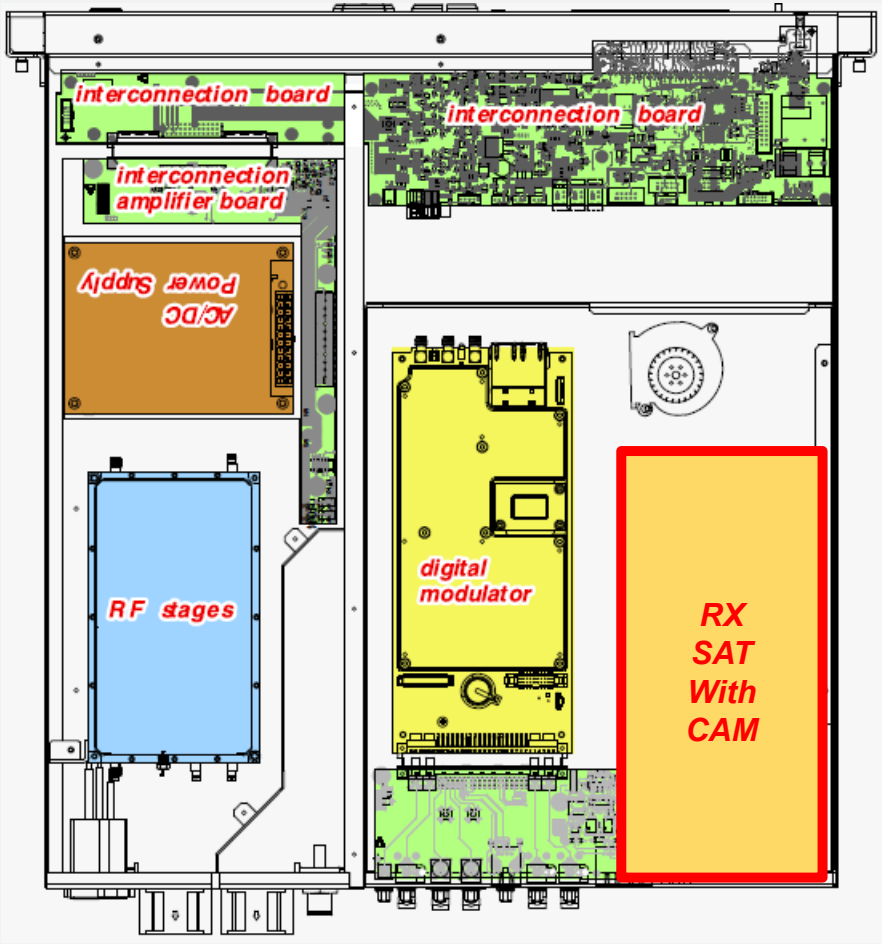


front view

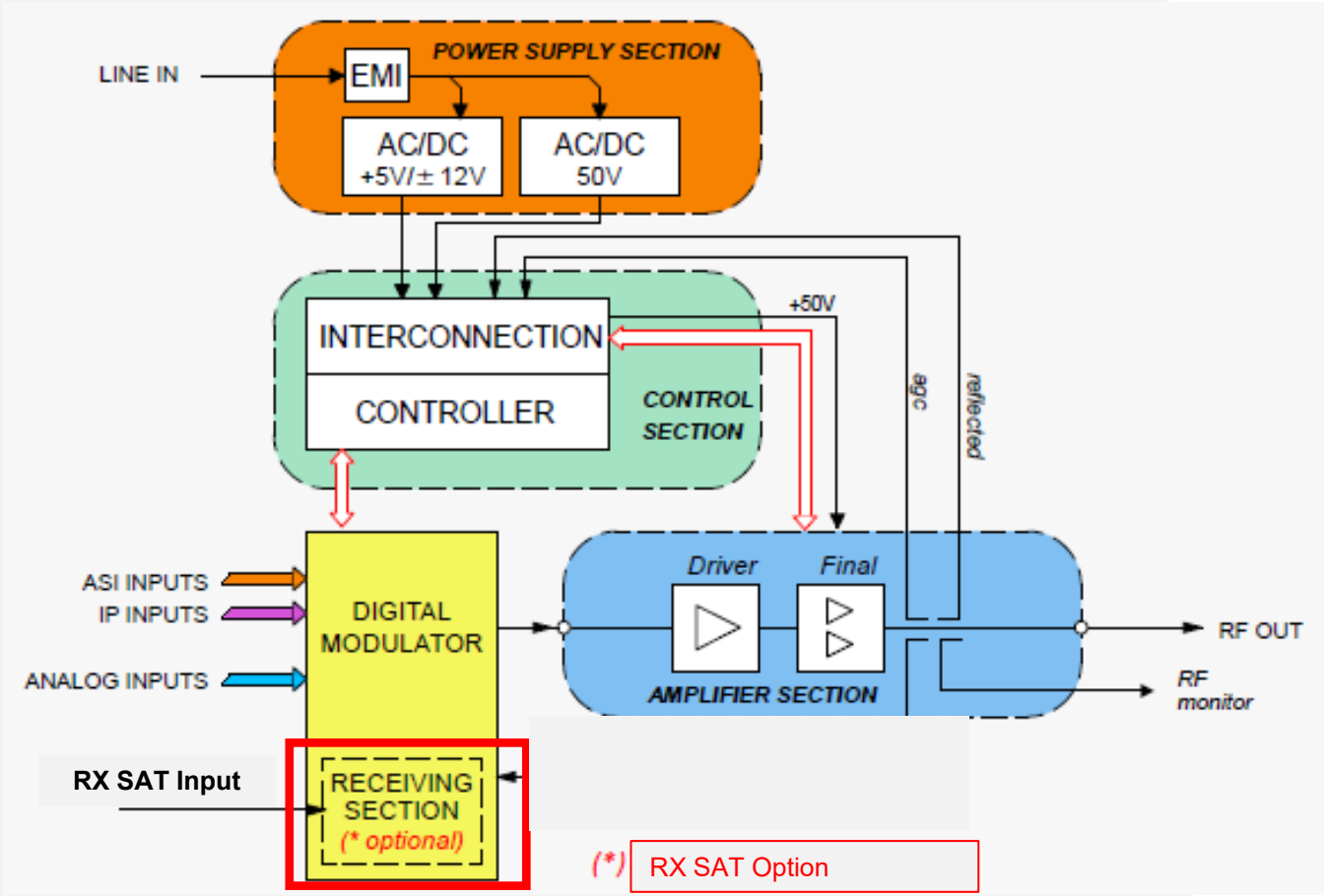


rear view

MEX II

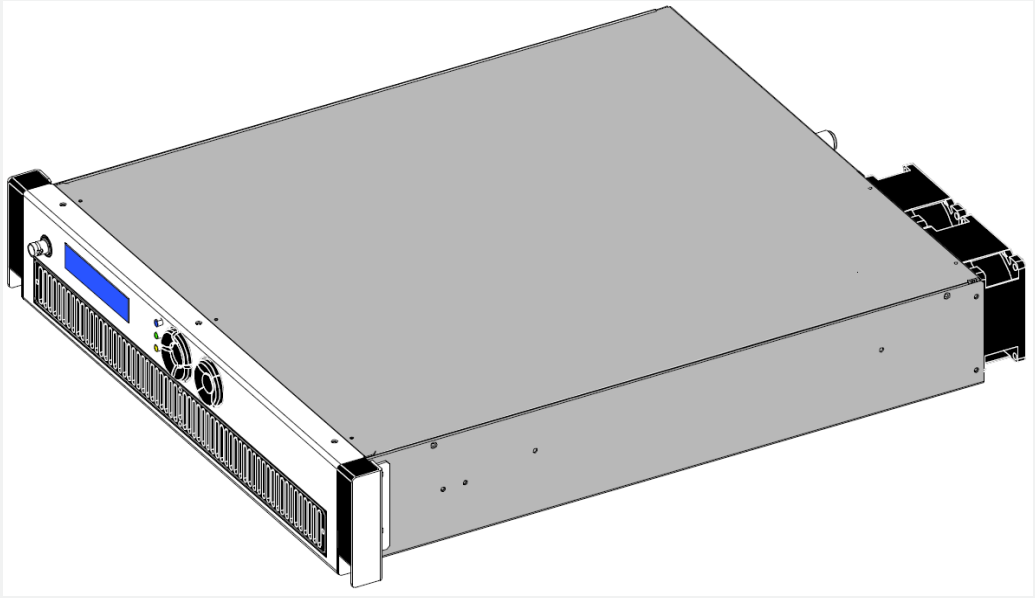


top view



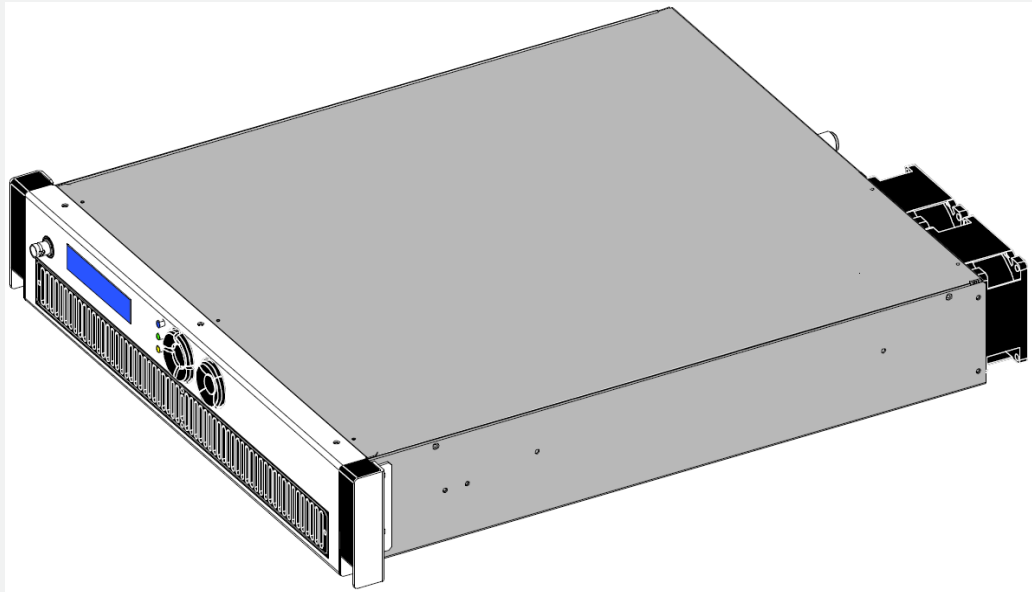
block diagram

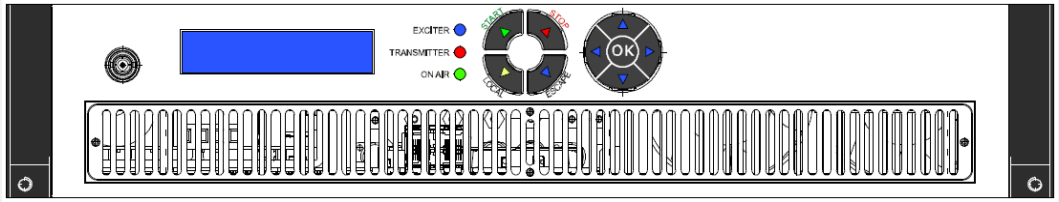
IEC 100 - 100W rms
Low power multimode Transmitter



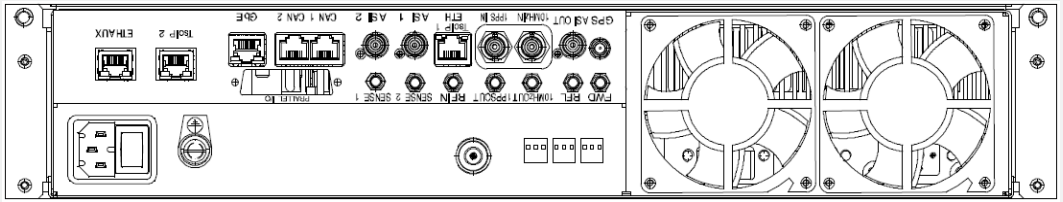
New 2 RU Design with Optional built-in Satellite Receiver

IEC 100 – 100W rms Transmitter



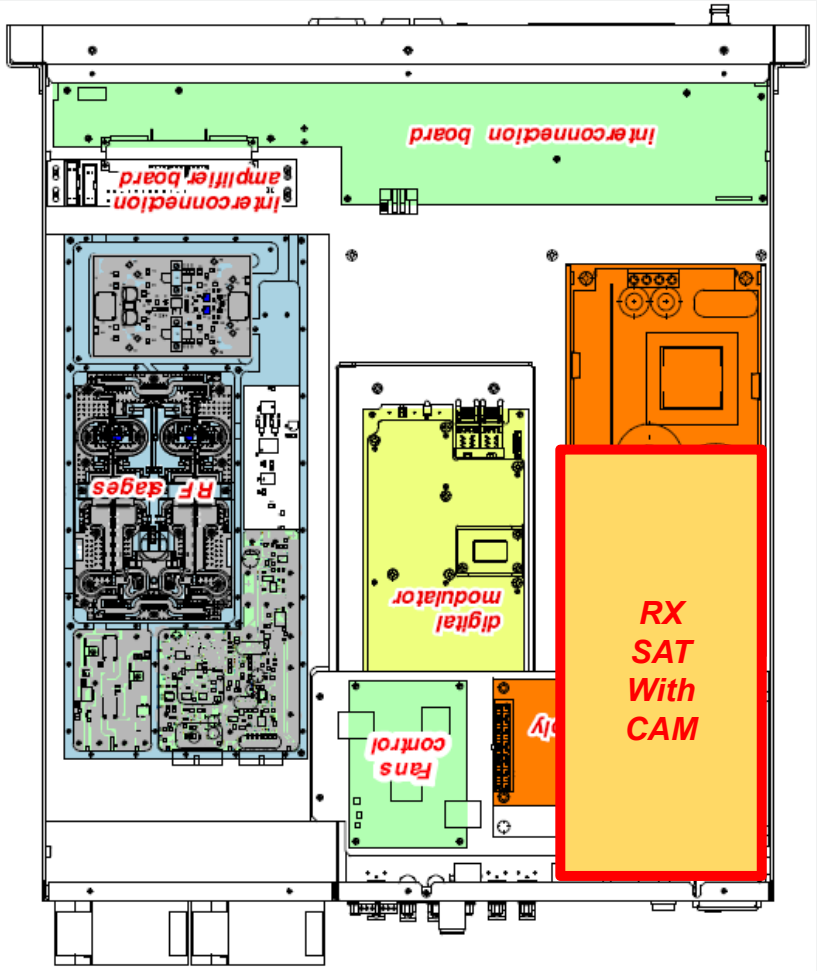


front view

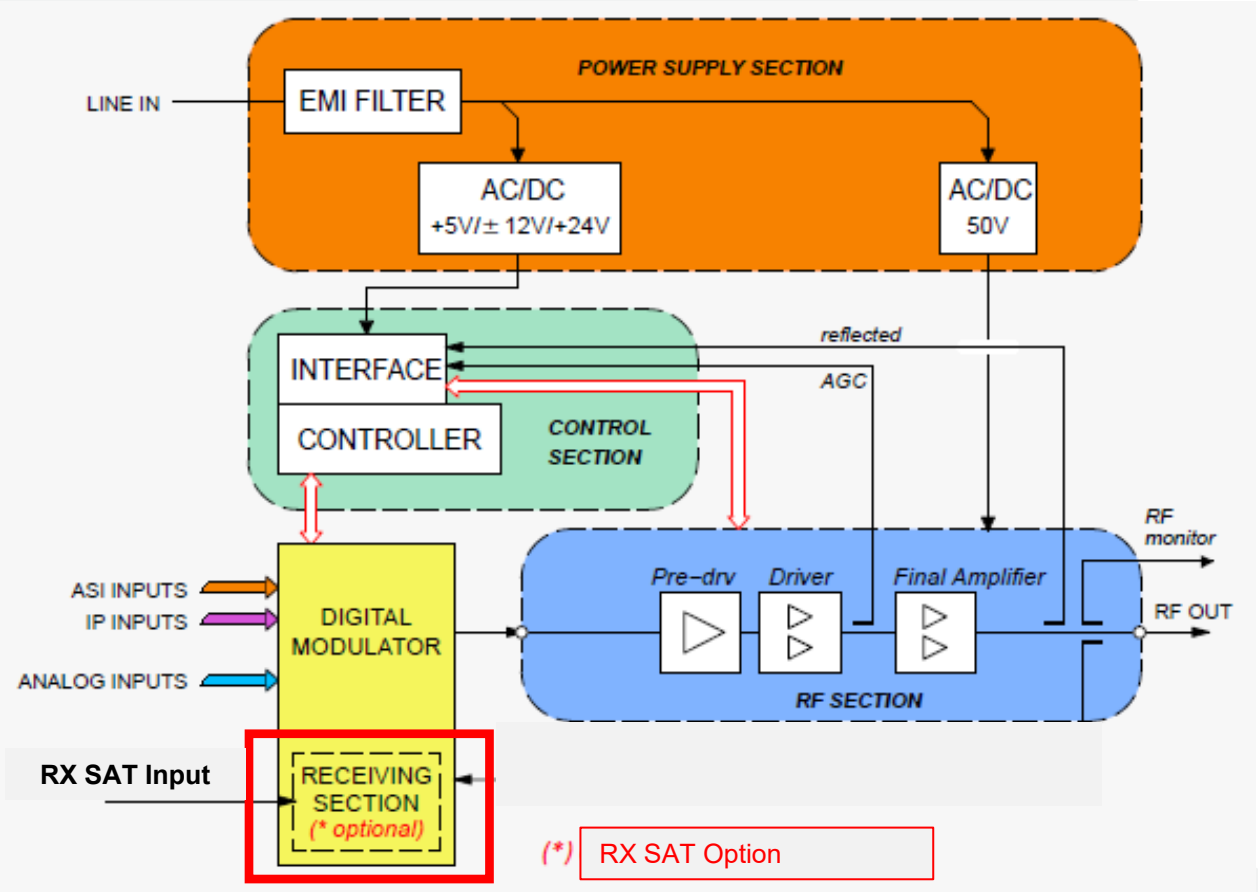


rear view

IEC 100 Transmitter



top view



block diagram

MEX II and IEC 100

Low power multimode

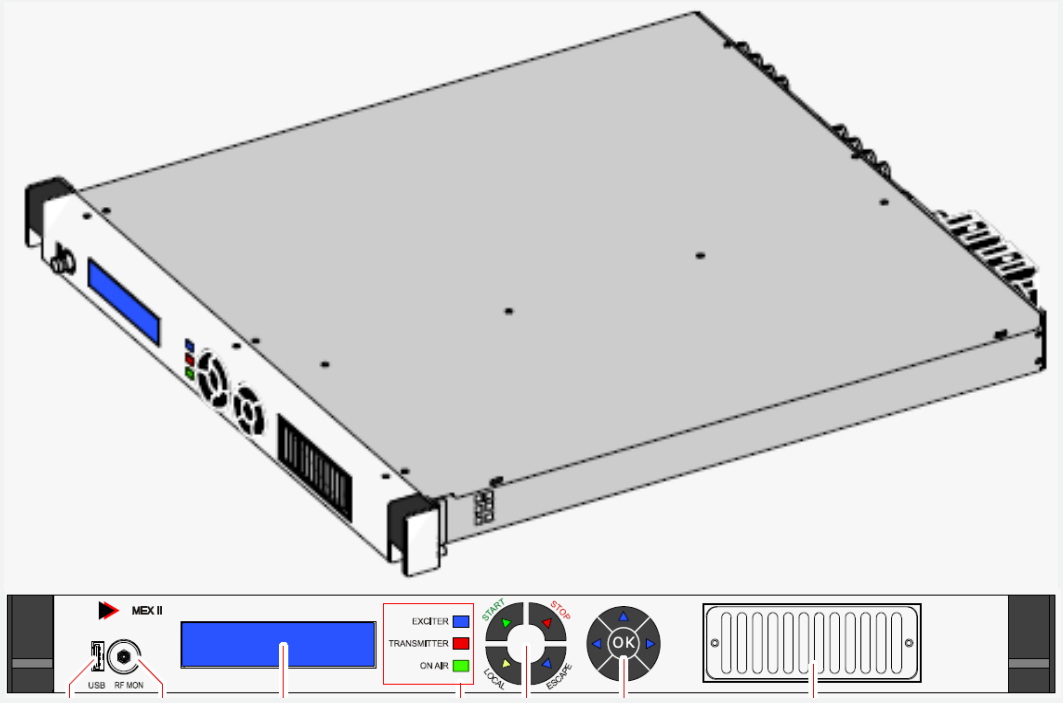
Exciters / Transmitters / Transposers / Gap-fillers

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

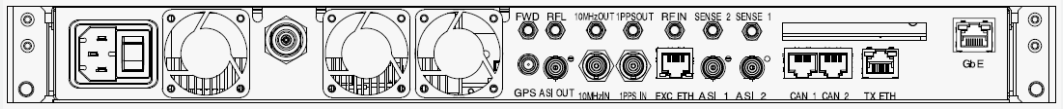
Multimode = Same hardware with different firmware for:

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

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

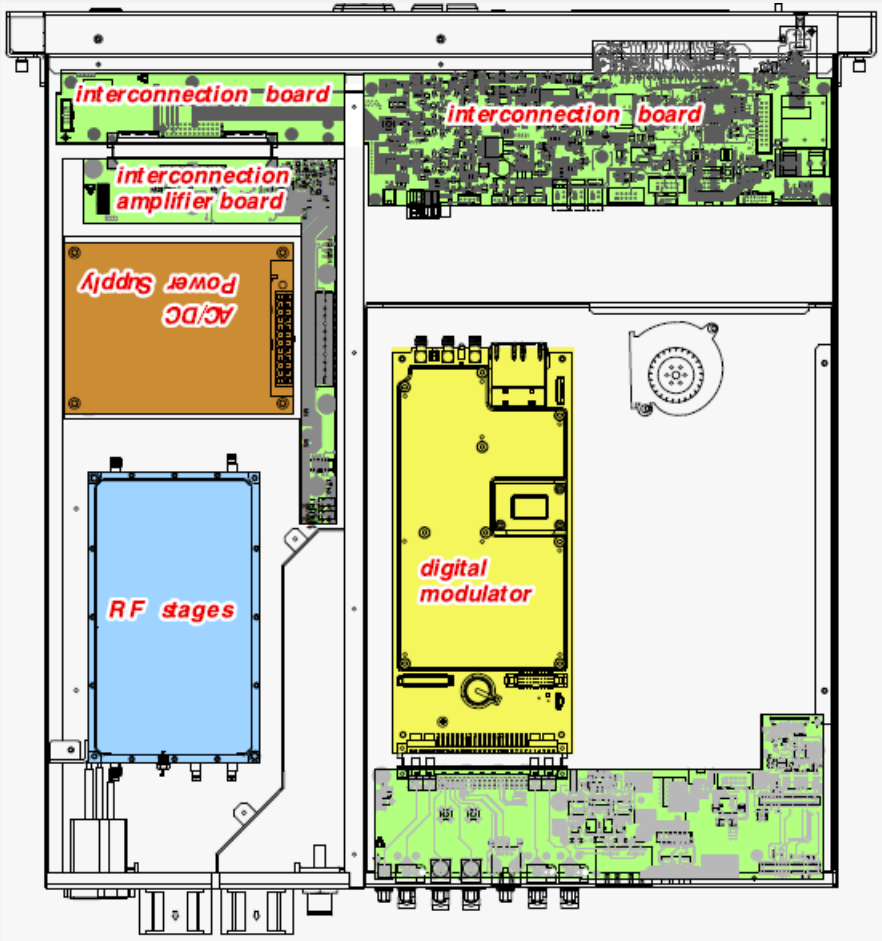


front view

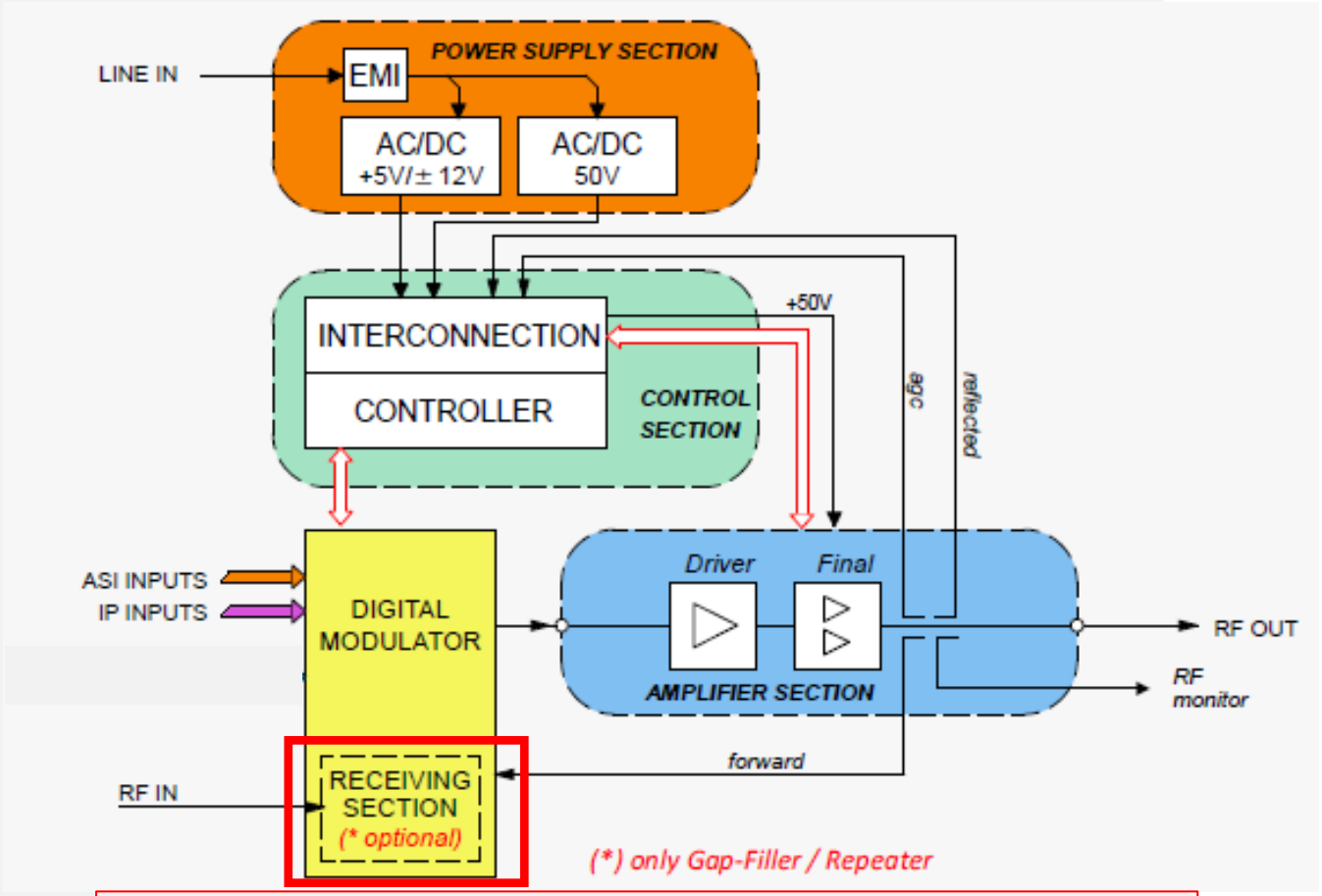


rear view

MEX II



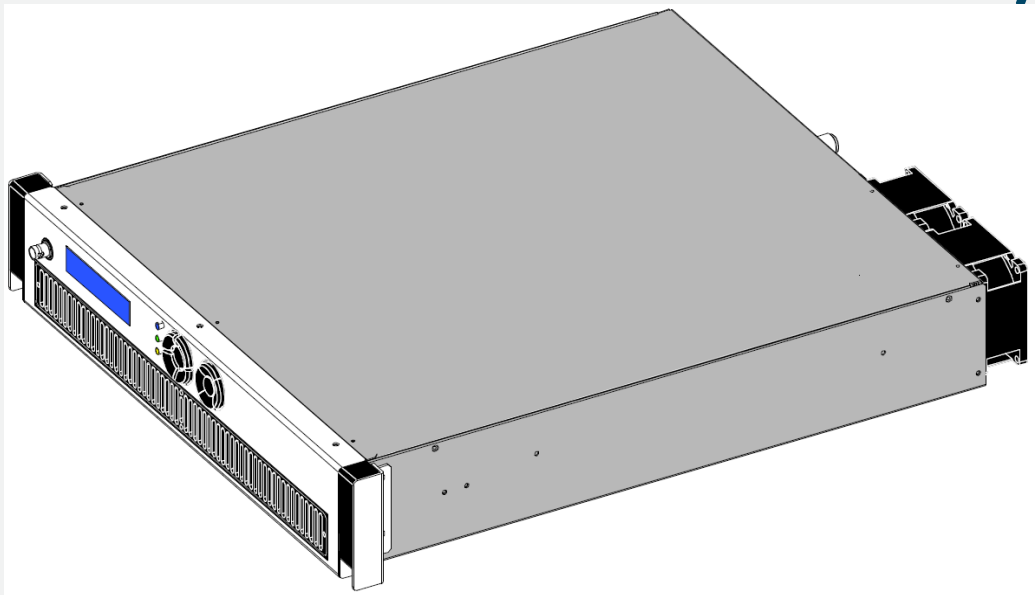
top view



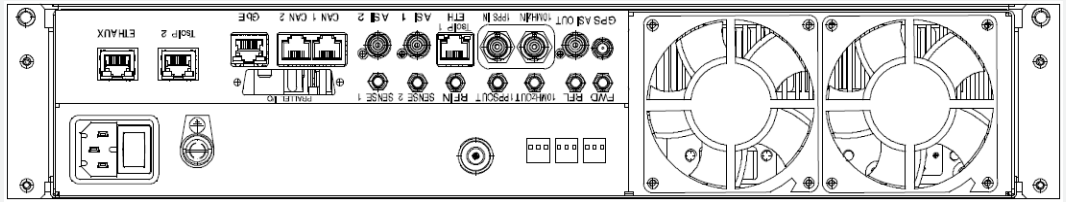
This down converter additional board transform the Exciter into a transposer / gap-filler

block diagram

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

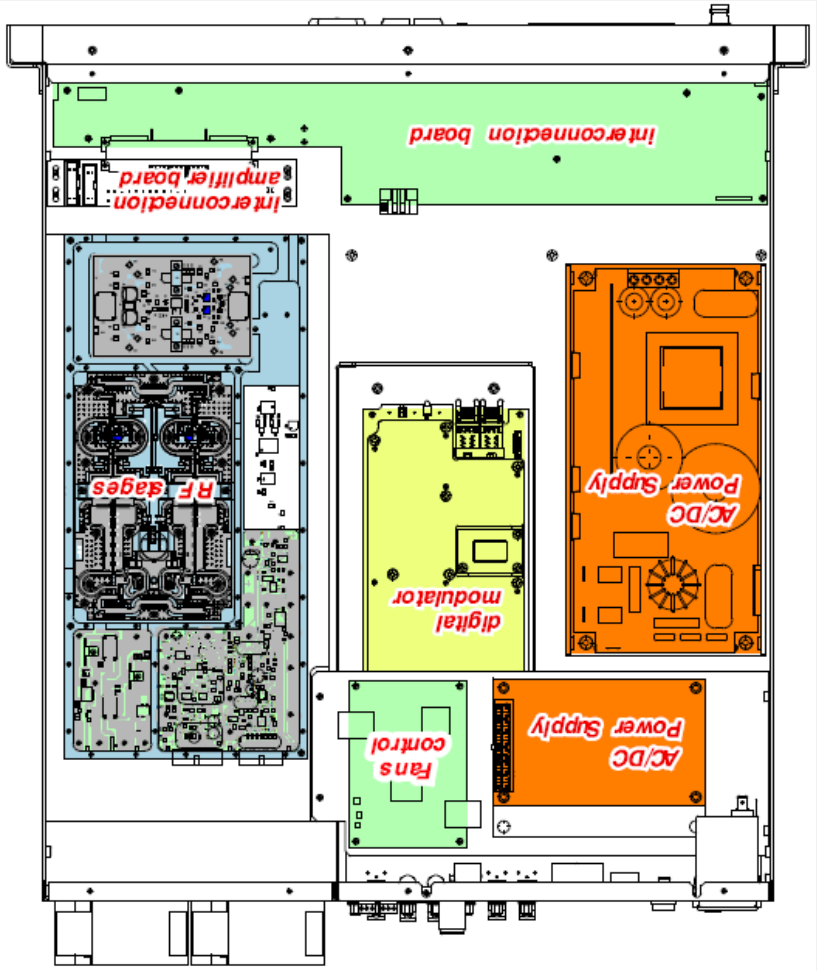


front view

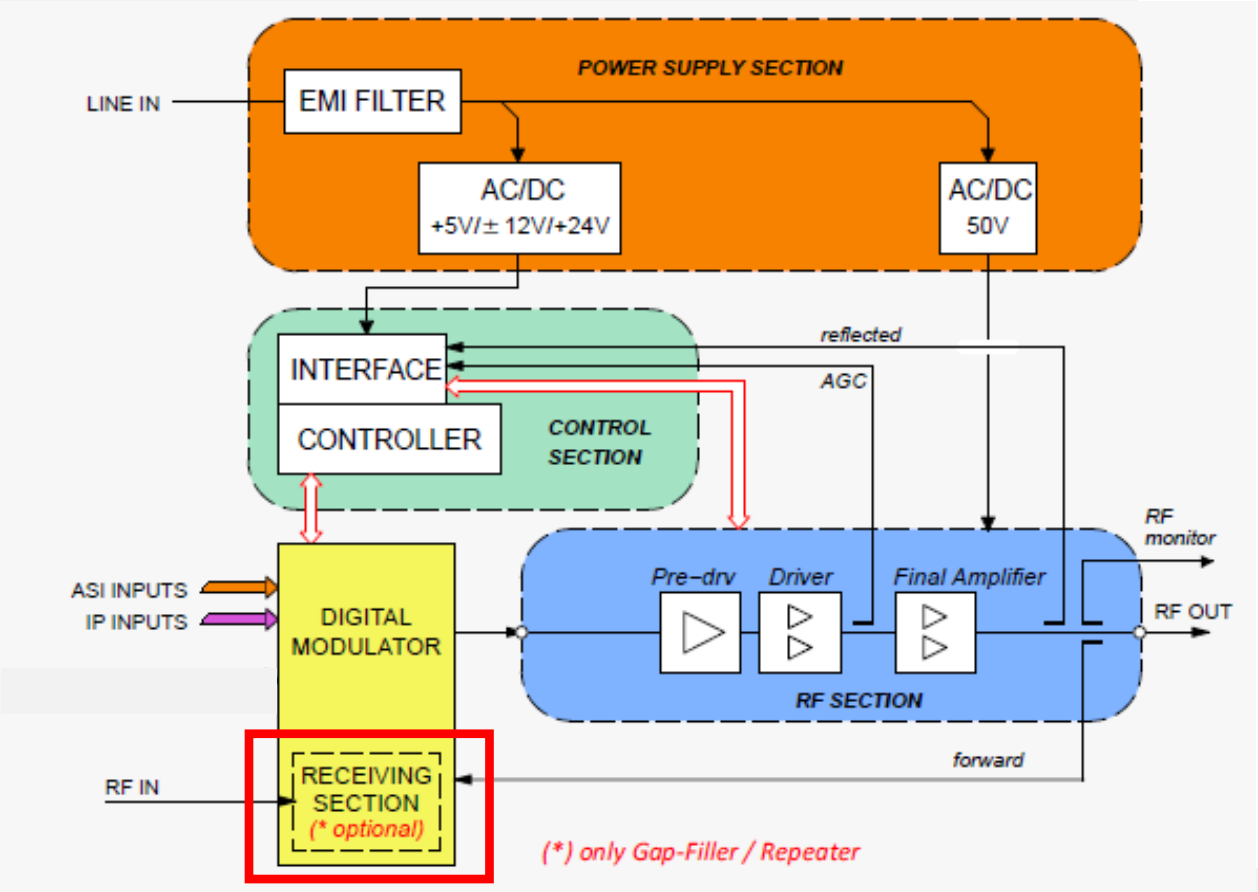


rear view

IEC 100



top view

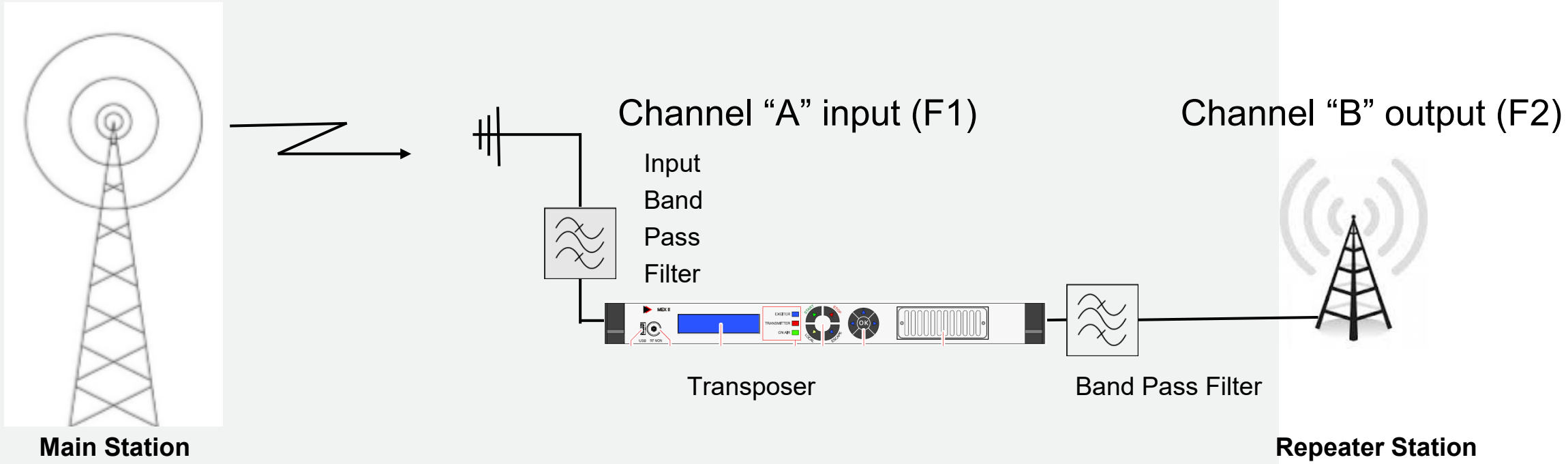


This down converter additional board transform the Exciter into a transposer / gap-filler

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”

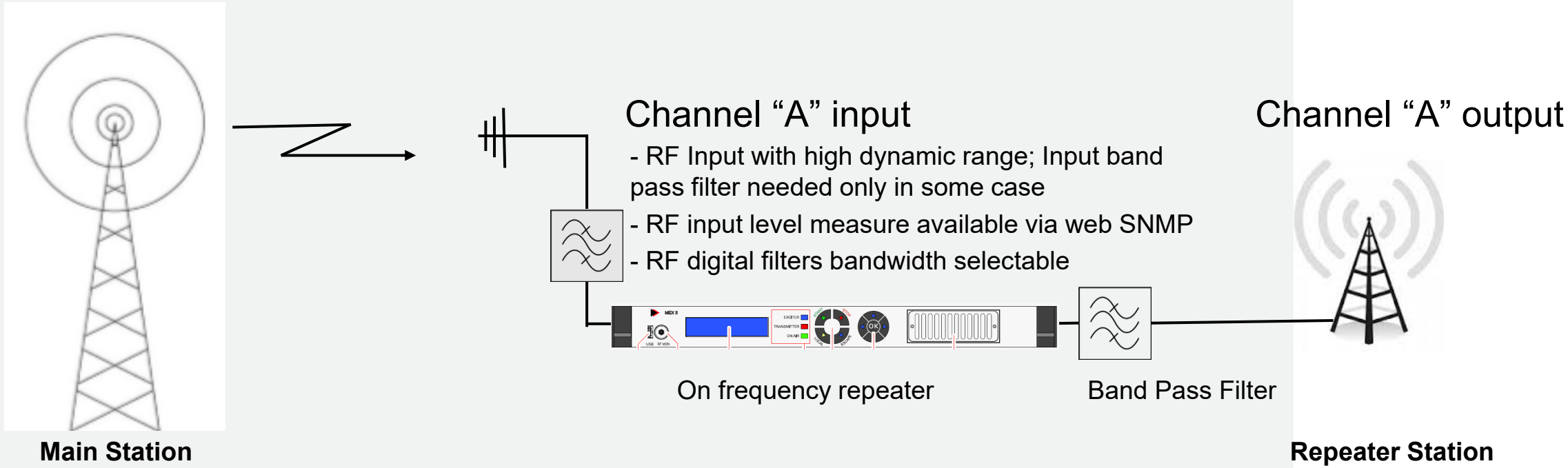
Transposer or Translator

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



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

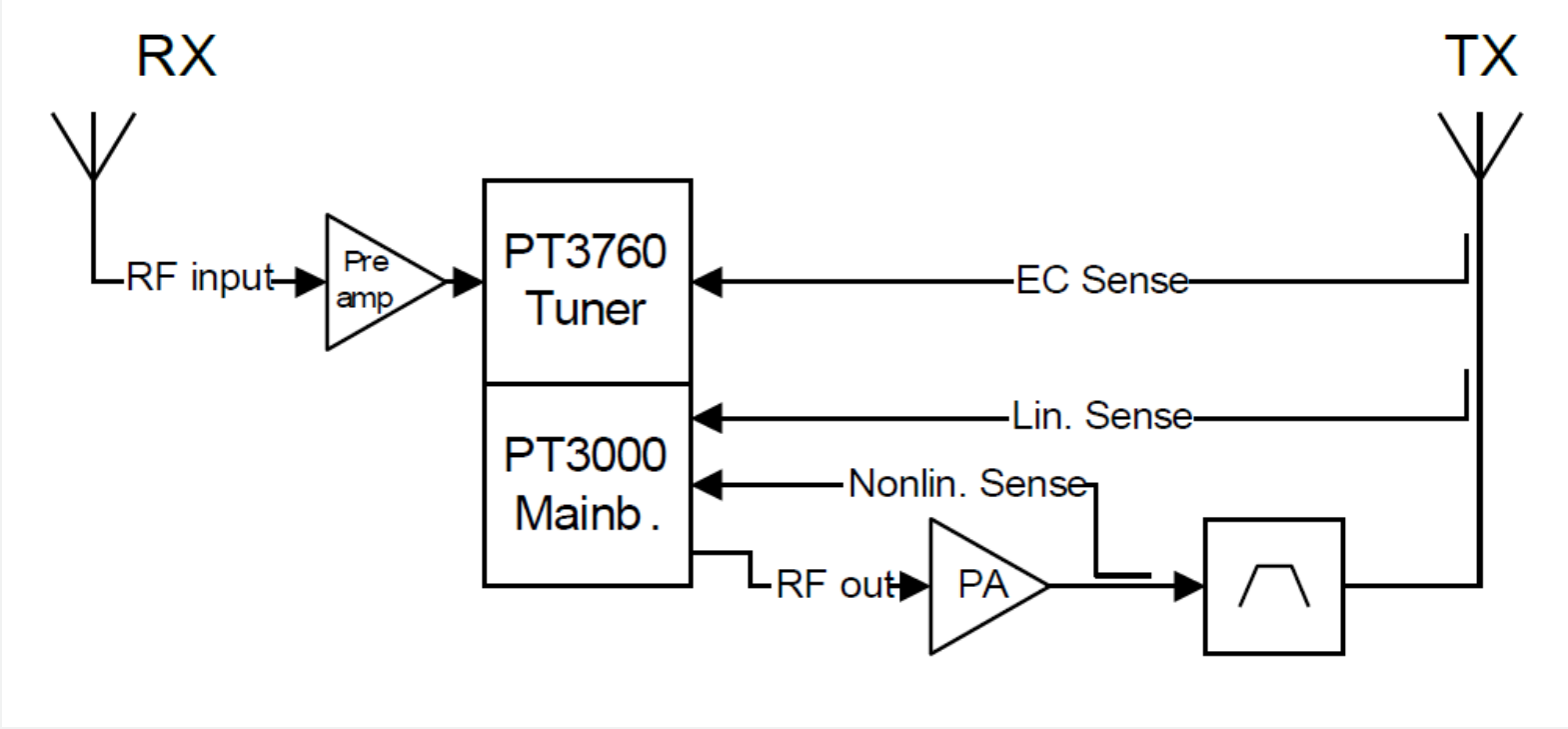
Disadvantages

- 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

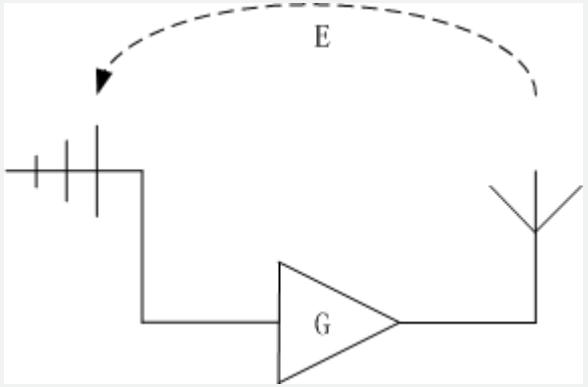
Advantages

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

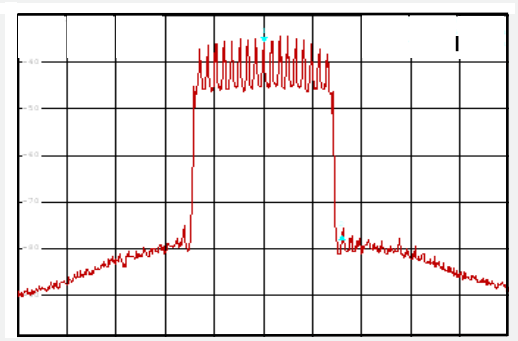
Gap-filler repeater block diagram



Concept of a signal “Echo”



Where the Echo is generated?

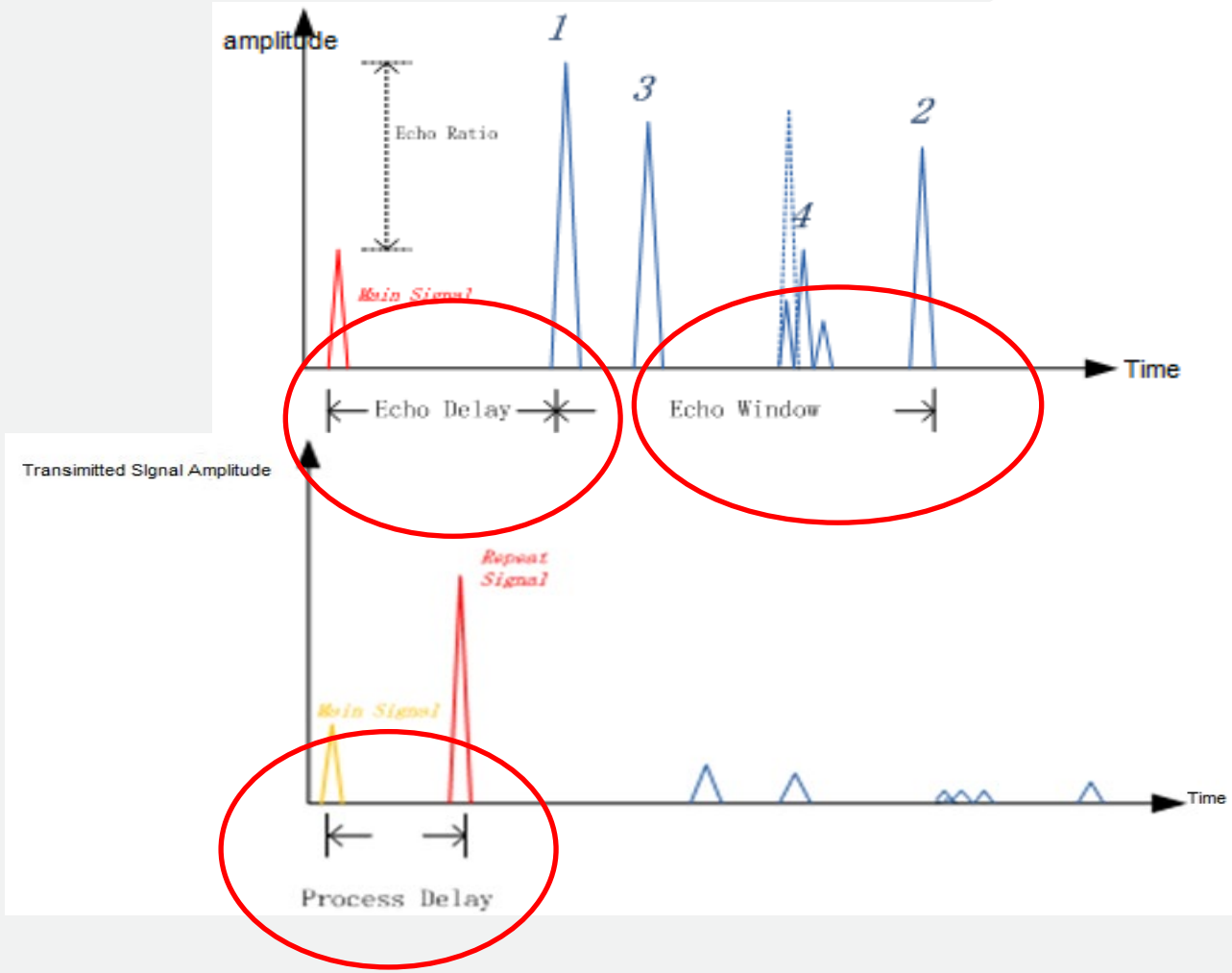


How the Echo is visible on the spectrum

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

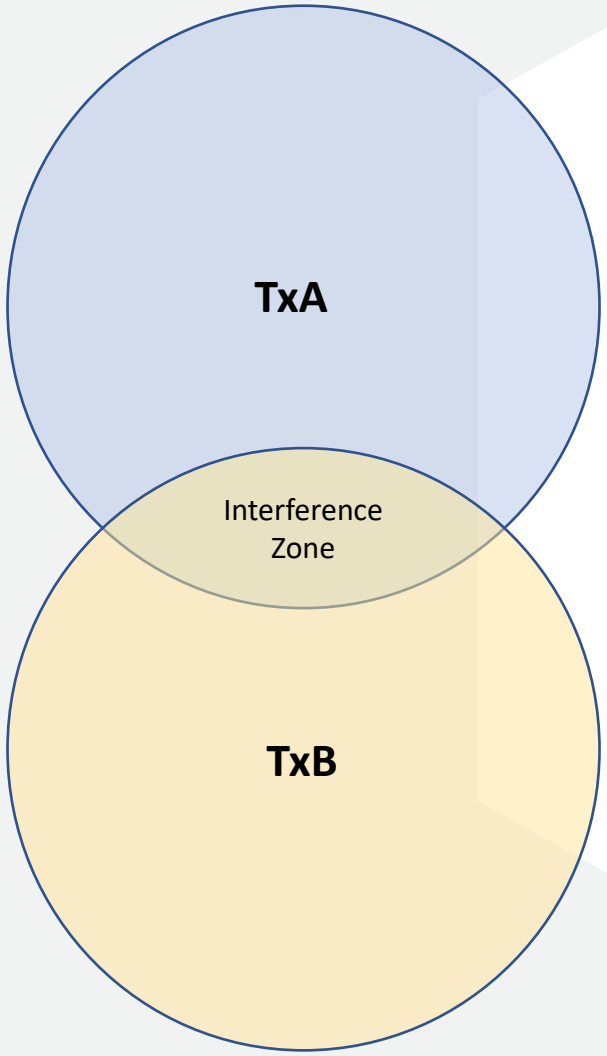


How to increase antenna isolation

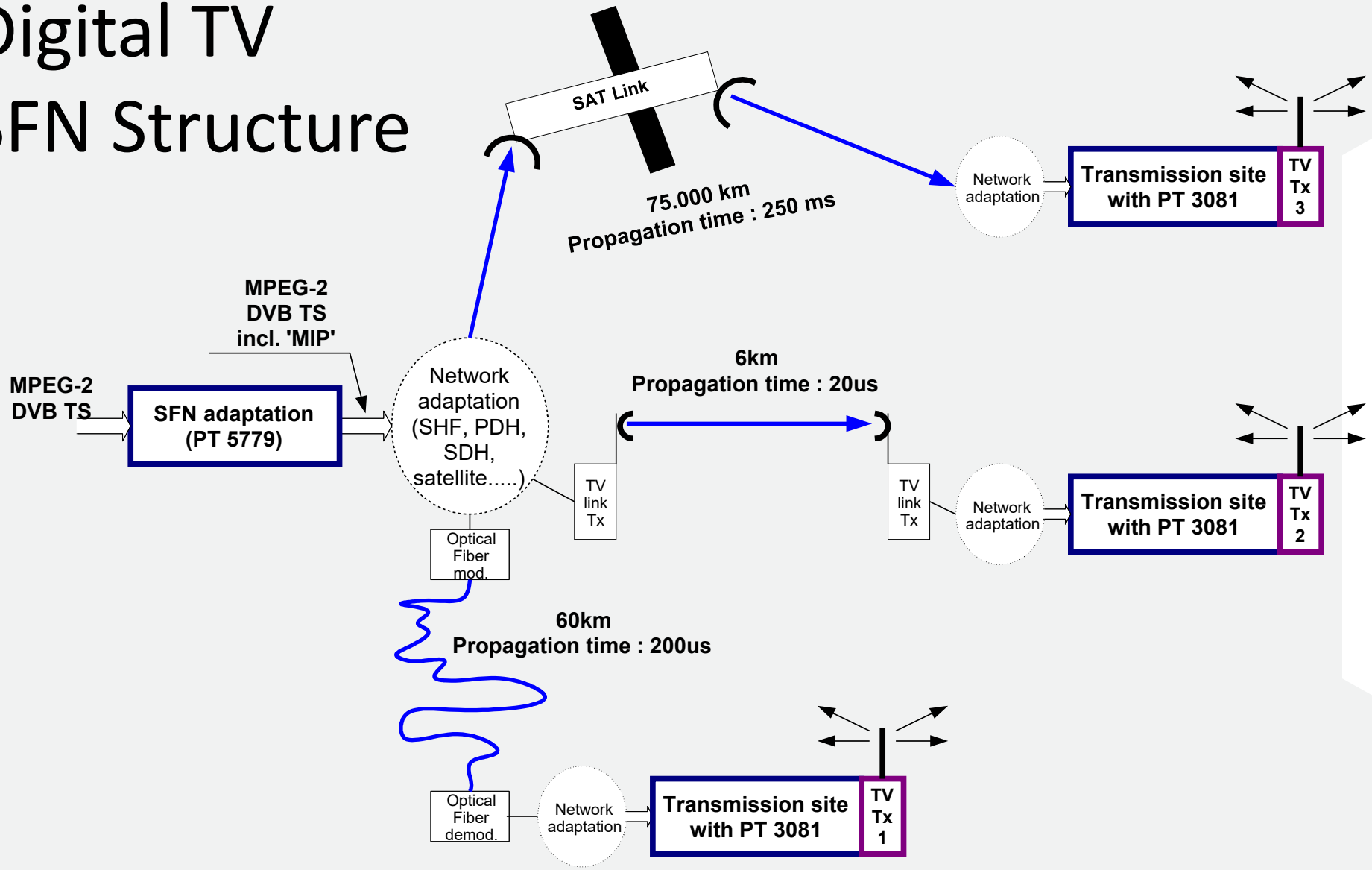
To get higher GAP Filler power, the antenna isolation has to be increased over 100dB in some transmitting sites. This is very difficult or even impossible. Application needs to be carefully evaluated and planned.

SFN Basics

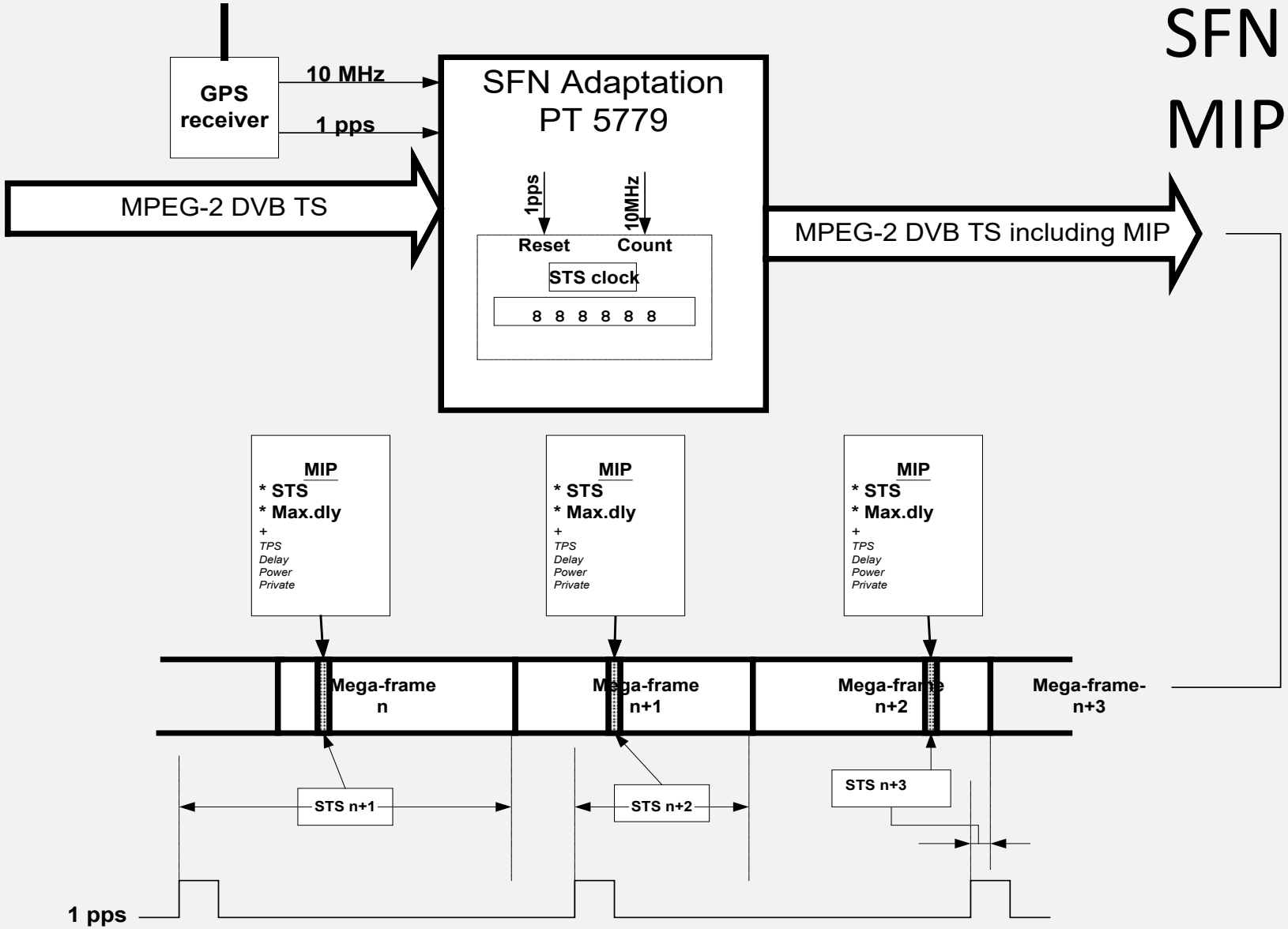
- SFN is a “Single Frequency Network”
- It allows continuous coverage from one transmitter area to another, and makes more efficient use of spectrum.
- SFN requires careful coverage planning, and precise timing.
- For digital TV and DAB, a “guard interval is used, but this is not possible for analog.
- 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

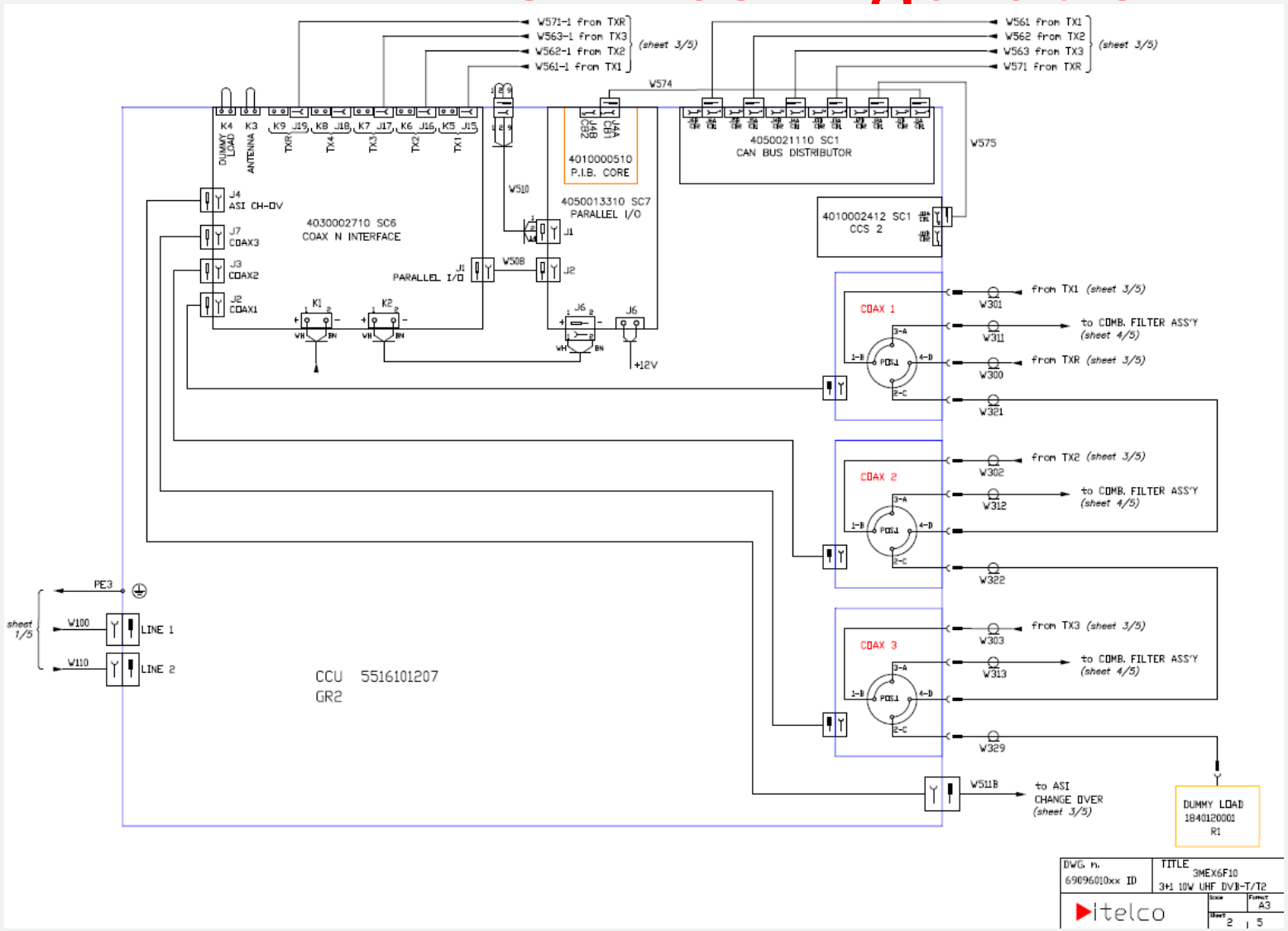
MEX II in 3+1 configuration

Front view

3+1 details

Synoptic with touch screen

MEX II in 3+1 configuration



MEX II
IEC 100
Available in:
1 + 1 Passive Reserve configuration
N + 1 configuration

Brief Company Introduction:

- Established in 1963 as Philips Test and Measurement
- 1964 First TV modulator introduced – more than 40 years of experience in the brodcasting market
- 1998 First generation DVB-T C-OFDM Modulator introduced (PT5775)
- Today more than 20.000 transmission site installations
- Per early 2003, PTT is owned by Managing Director Morten Simonsen

ProTelevision Today:

- Located in Copenhagen, Denmark
- High focus on R&D – 25 engineers working solely on C-OFDM technology (DSP, RF, SW, HW)
- All production outsourced to ISO Certified specialists
- Calibration, verification and test certificate of each piece of equipment done at PTT (100 hours burn in)
- DVB member (actively participated in the creation of several standards)

LEADING MANUFACTURER OF DTT MODULATORS

ISDB-T

ISDB-Tb

- ISDB-T and ISDB-Tb Homologated support
- REMUX SW option to support input TS 188 bytes
- 2x TSoIP Inputs 1Gb
- Adaptive precorrections Linear and Non linear

ISDB-T **ISDB-Tb**

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PRO TELEVISION TECHNOLOGIES

- Most Advanced Technology of Precorrection in the Broadcasting Market.

- Thanks to:
  Optimized precorrection technologies and 2) Exclusive technics of crest factor reduction,

  Optipower increases the efficiency of any amplifier from 2% to 5%

OPTI POWER®

Intuitive and user friendly WEB Graphical User Interface

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Modulator/Exciter

ATV (comming soon)

Pro Televison Technologies

- Pro Televison Technologies
- ATV Modulator
- Analog Video/Audio input
- SDI Input
- PAL and NTSC color
- G, D1, M, K, I1, K1, N, NC, I
- Exact same base module as the DTV products

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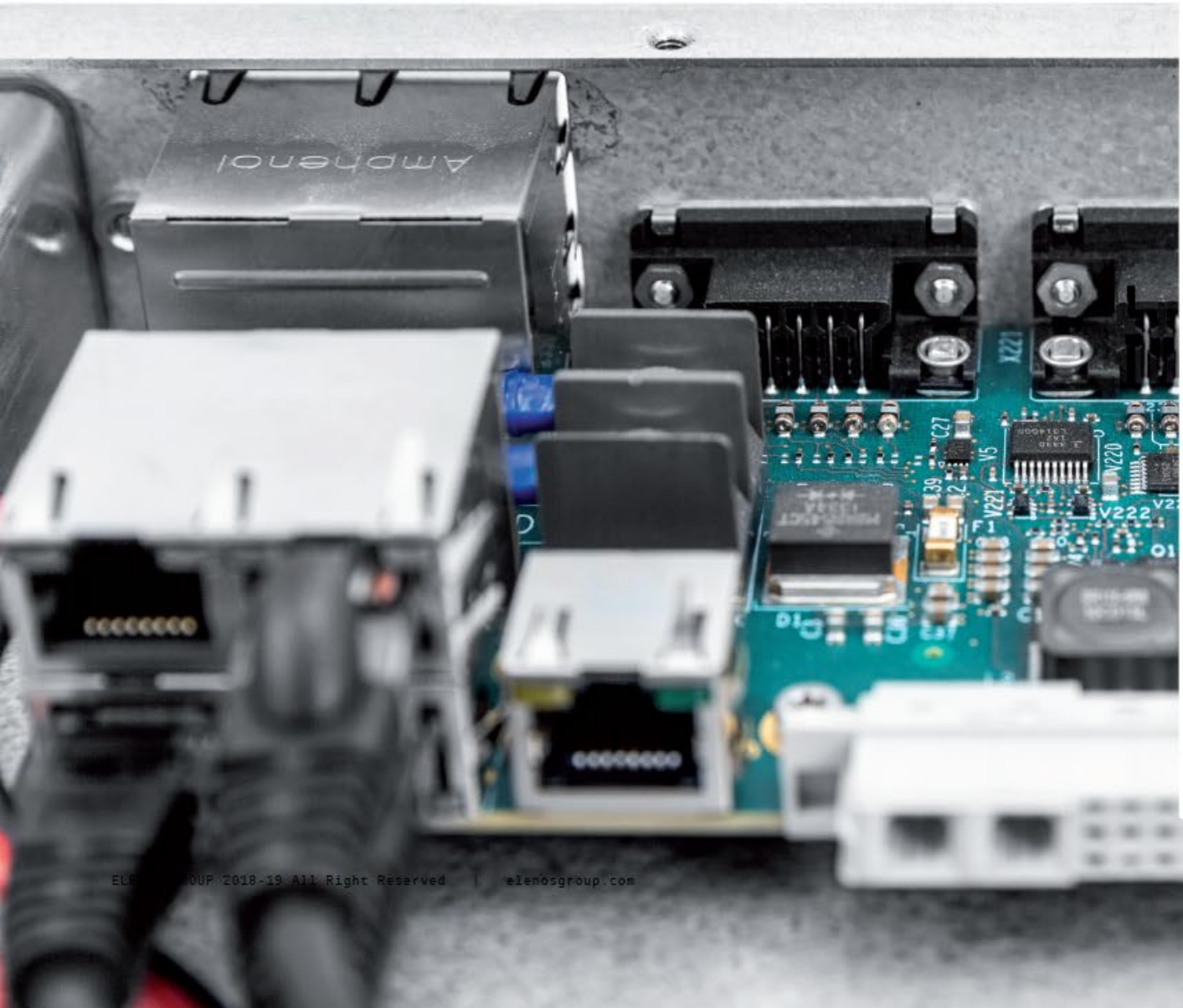

Modulator/Exciter

ISDB-T ISDB-Tb

Pro Televison Technologies

- SFN and MFN
- ISDB-T and ISDB-Tb Homologated support
- REMUX SW option to support 188 bytes TS
- 2x TSoIP Inputs 1Gb
- Digital Adaptive precorrections Linear and Non linear
- Optional OCXO and GNSS add-on modules

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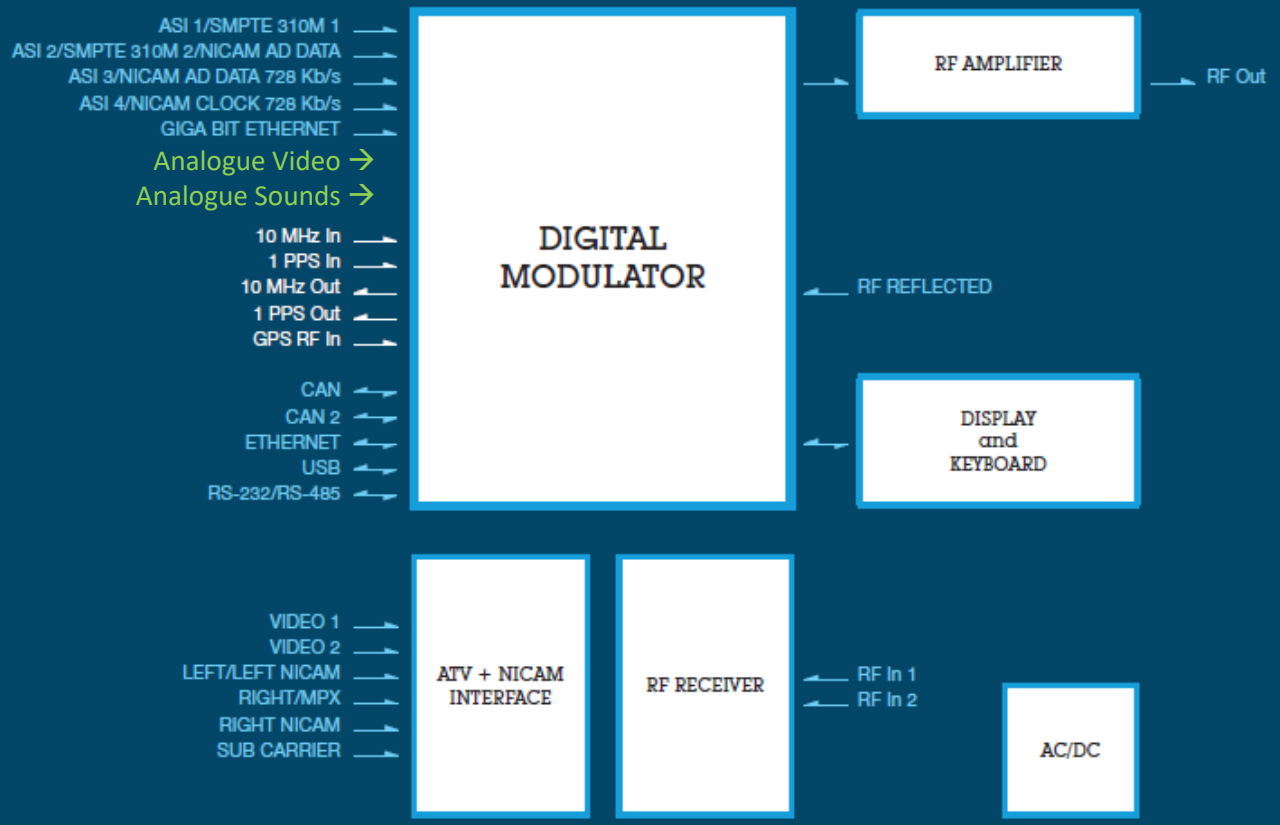
Functional Block Diagram



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TV Transmitters
MEX II block diagram

Itelco Broadcast

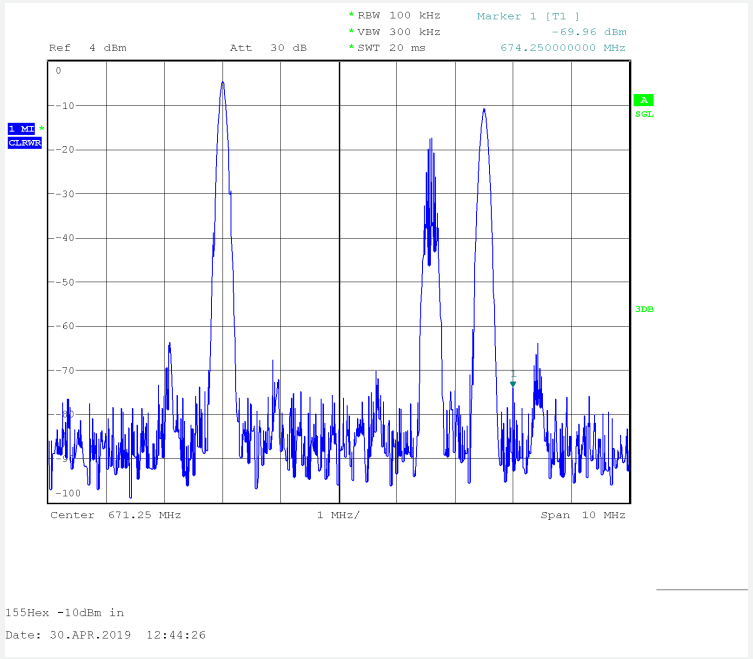
- MEX

DUAL CAST EXCITER

ANALOGUE INPUT MODULATION FOR ANALOGUE SPECTRUM TRANSMISSION

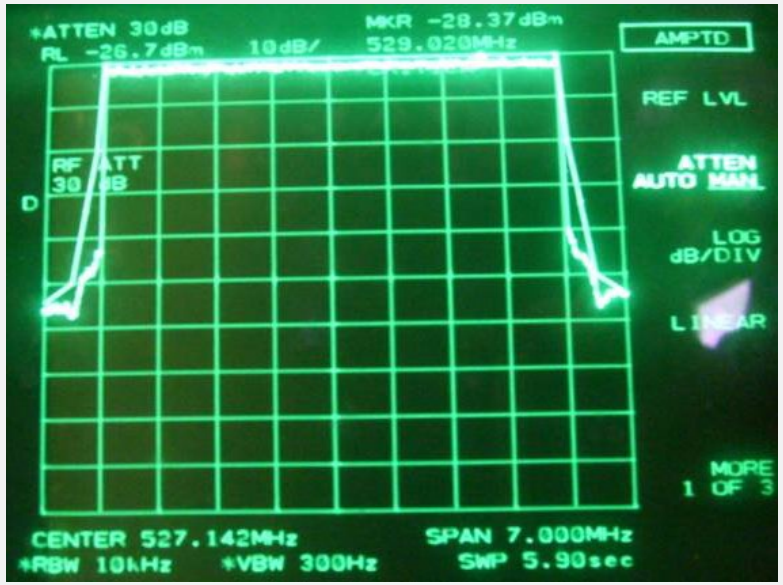
BTS DIGITAL INPUT MODULATION FOR ISDB-Tb SPECTRUM TRANSMISSION

ELENOS BE itelco PRO TELEVISION



Analogue Spectrum mask

- Only one program in 6MHz channel



ISDB-Tb

- Several programs in 6MHz channel
- Possibility of adjacent channel and coadjacent channels
- MFN or SFN network operation
- Energy saving (transmitting site and power reduction
- Head-end mobile

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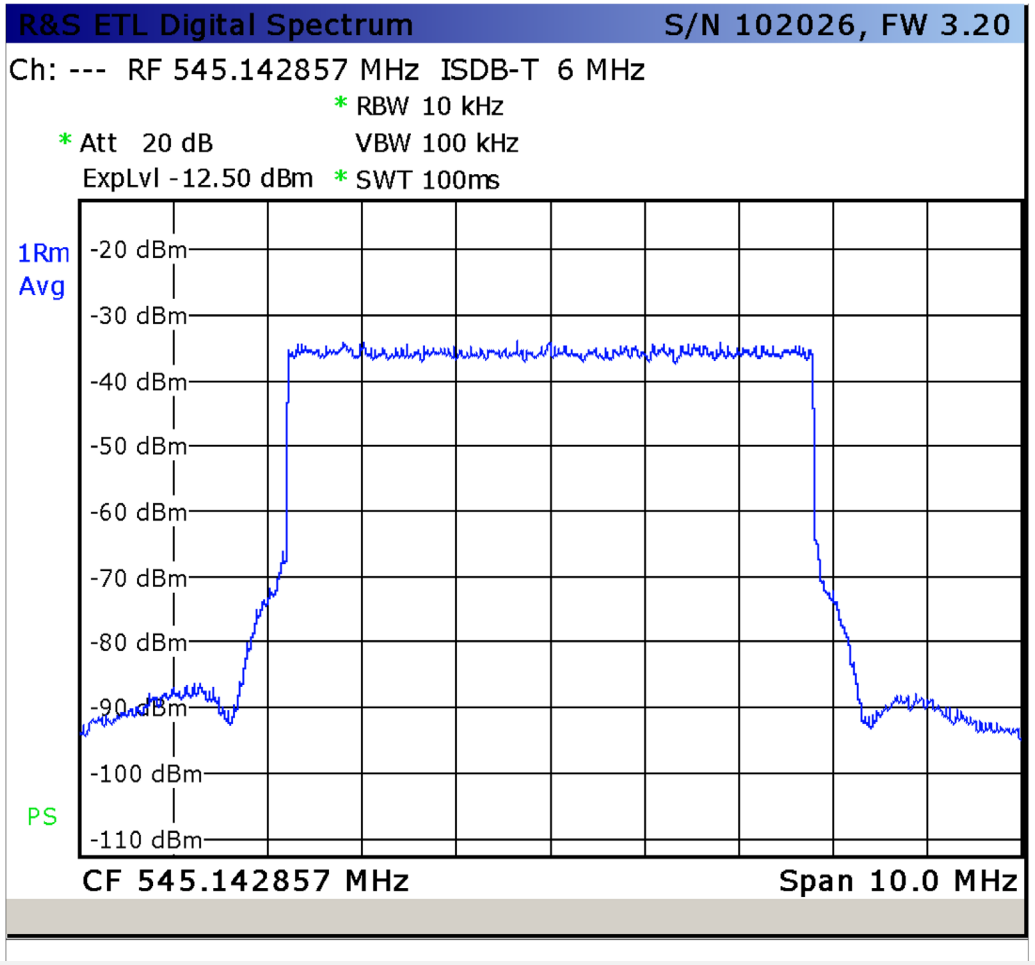
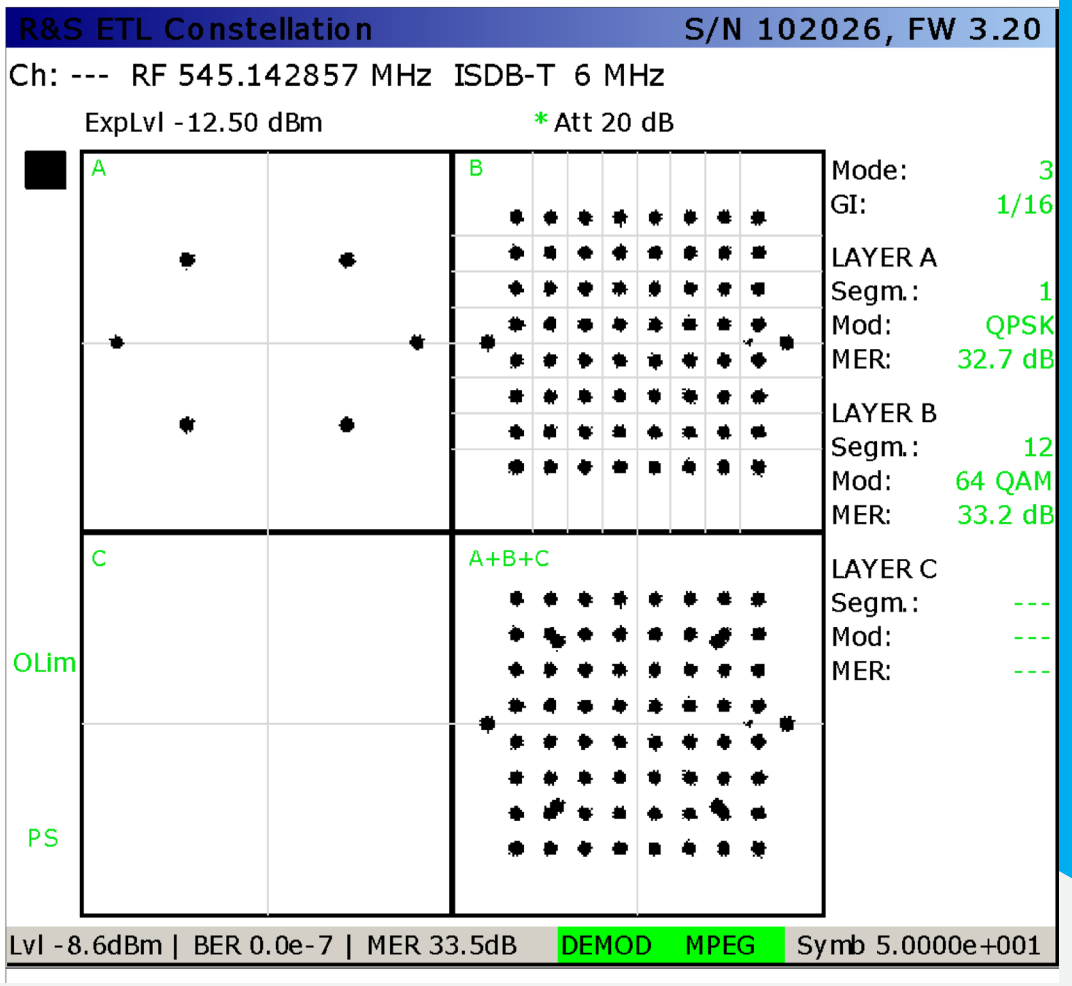
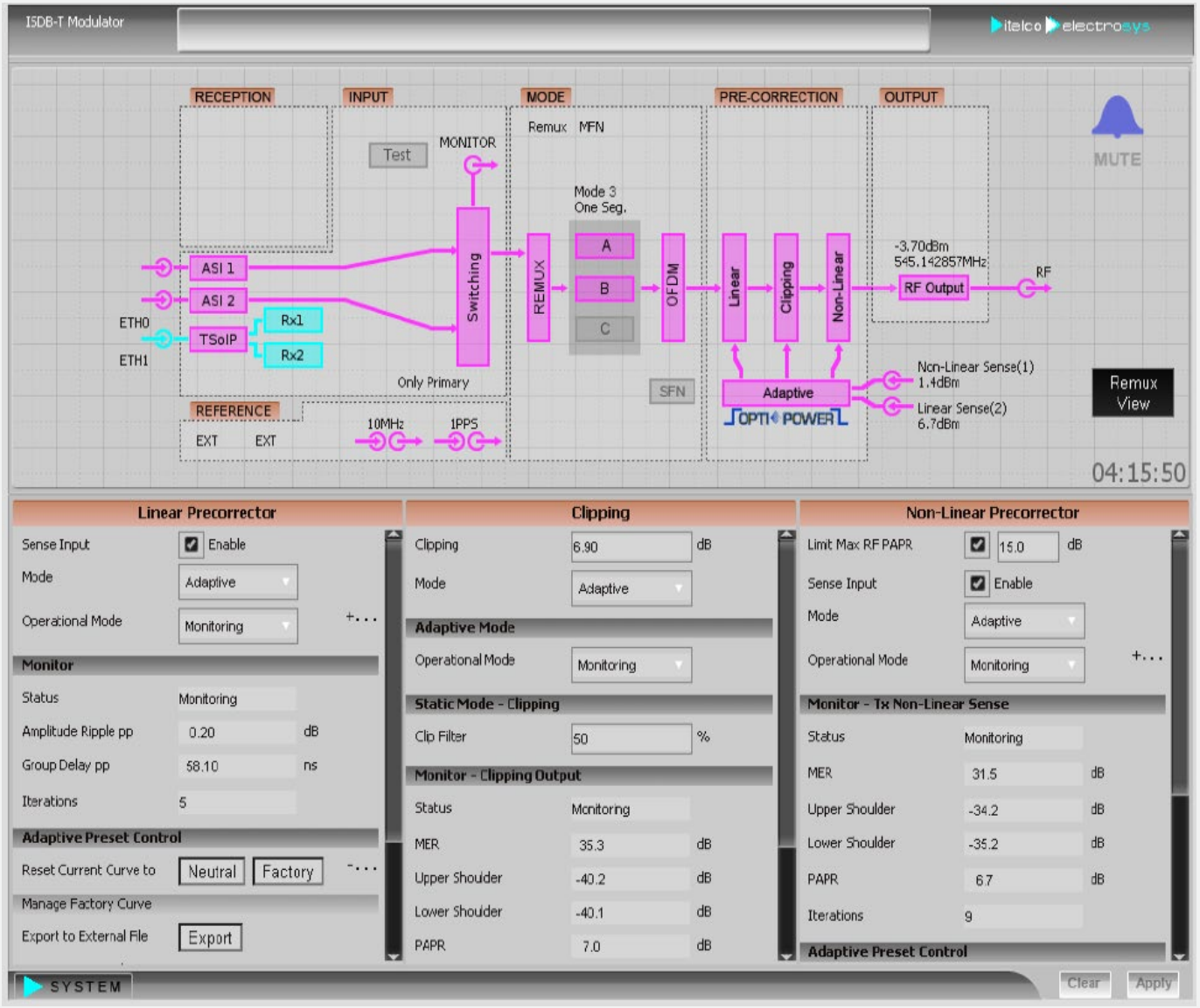
[x] Spectrum



[x] Constellation



The Group Itelco | ISDB-Tb Modulator Synoptic Control



Itelco transmitters and ISDB-Tb Advantages

Transmitters Advantages

- Ownership Cost reduction
- Power Consumption reduction thanks to the high efficiency technology
- Hot plug systems and full redundancy on RF and PS stage
- Extremely high MTBF thanks to the Itelco quality and experience

ISDB-Tb Advantages

- Several programs in 6 MHz channel
- Adjacent and coadiacent channels use
- MFN or SFN operation mode
- Head-end mobile mode available
- Service cost reduction
- Owner consumption reduction due to several
- programs in the same channel
- Multimedia Service transmission
- Transmitting site power reduction

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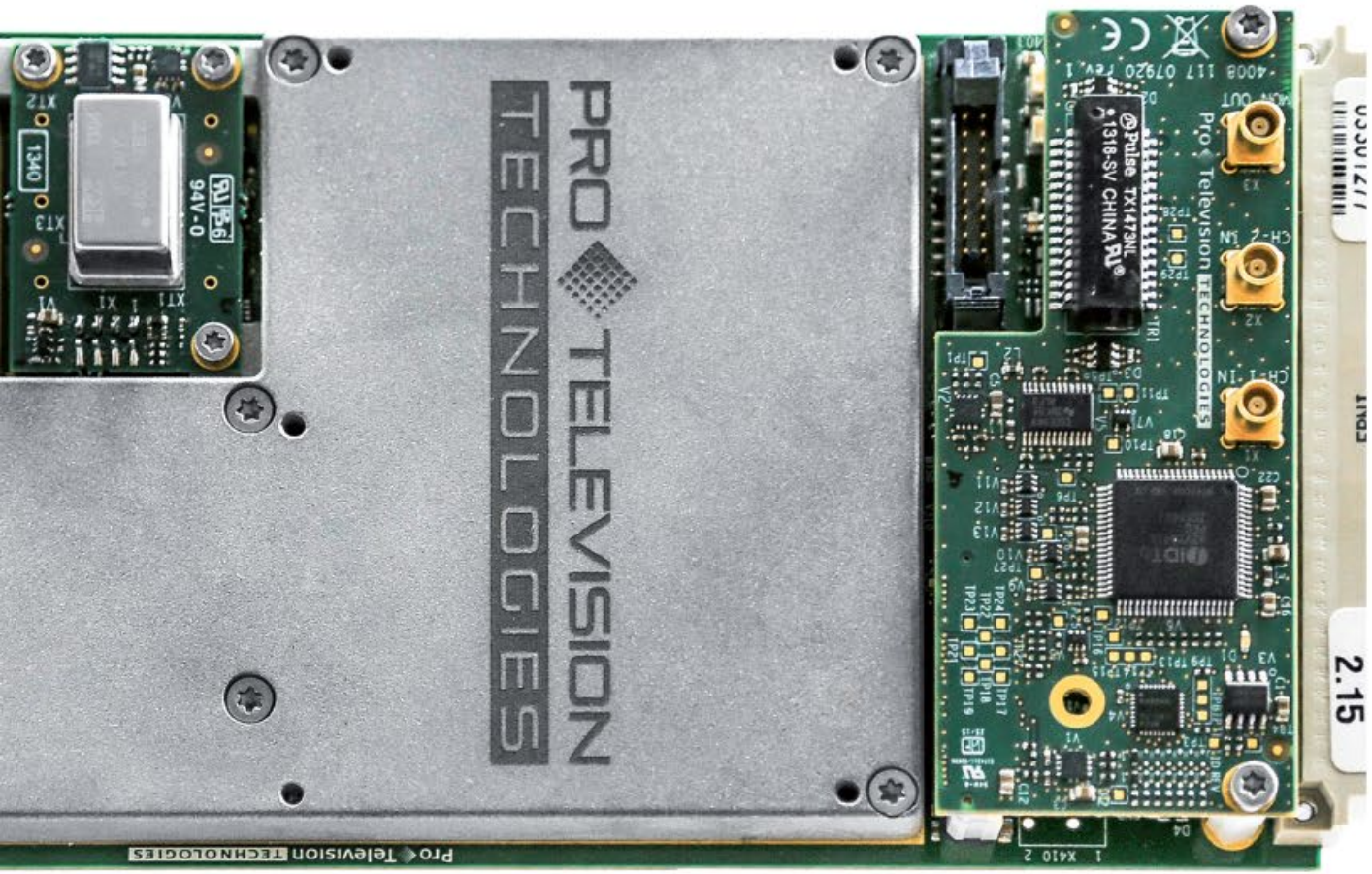

Modulator

DAB Digital Audio Broadcasting

DAB+ Digital Audio Broadcasting

Pro Televison Technologies

- DAB / DAB+ / T-DMB
- Digital Adaptive Precorrection Linear and Non-linear
- Seamless input stream switching ETI-ETI, ETI-EDI, EDI-EDI
- 2x Gigabit IP inputs with EDI protocol
- Optional OCXO and GNSS add-on modules

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