



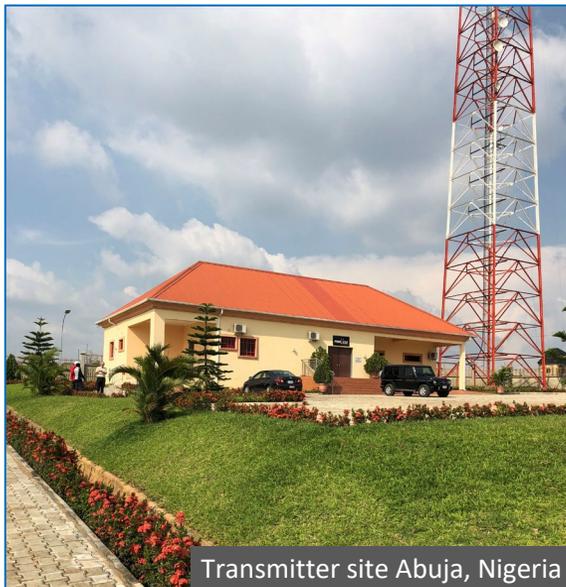
## REINVENTING THE TRANSMITTER SITE: MAXIVA PMTX-1 OUTDOOR TRANSMITTER AND APPLICATIONS REVIEW

---



MARTYN HORSPOOL  
PRODUCT MANAGER –TV  
MASON, OHIO, USA

# MAXIVA PMTX-1 OUTDOOR TRANSMITTER AND APPLICATIONS REVIEW



## Today's Virtual Event:

- PMTX-1:
  - The broadcast transmitter site has remained basically the same over the course of history. Based on real world experience GatesAir has redefined how modern broadcast TV transmitters can be deployed, and what the site requirements are. We will review a compact approach that radically reduces the cost to deliver content.
- + Bonus item:*
- IMTX-70:
  - A quick look at a new design for a portable & very compact “non-rackmount” multi-transmitter system will be discussed.

# GATESAIR IN USA & ITALY



**Bruce Swail**  
CEO – GatesAir  
USA



## United to Create One Company

- GatesAir USA had a long-term relationship partnering with Onetastic Italy for low power products for over 5 years.
- Italy has some of the finest RF engineers in the World.
- Top-notch support from all major component suppliers.
- Onetastic customers very enthusiastic regarding product quality and design and GA ownership.
- Engineering from both sides are now integrated - The best technology from Europe is being combined the best technology from the USA



**Luca Saleri**  
General Manager - GatesAir Srl.  
Italy





**QUINCY, IL USA**



**BRESCIA, LOMBARDY, ITALY**



# VERSATILE LOW POWER TV PRODUCTS



**IMTX-70 DESKTOP TX**



- Compact and portable
- 230 x 485 x 320mm (9.1" x 19.1" x 12.6")
- Up to 6 separate transmitter modules
- Output power: 70W rms per module (Pre-Mask Filter)

- Outdoor, weatherproof design
- Flexible mounting (pole, wall, etc.)
- Self-contained, with integrated Mask Filter
- Output power: 50W (after Mask Filter)



**PMTX-1 OUTDOOR TX**



GATESAIRCONNECT

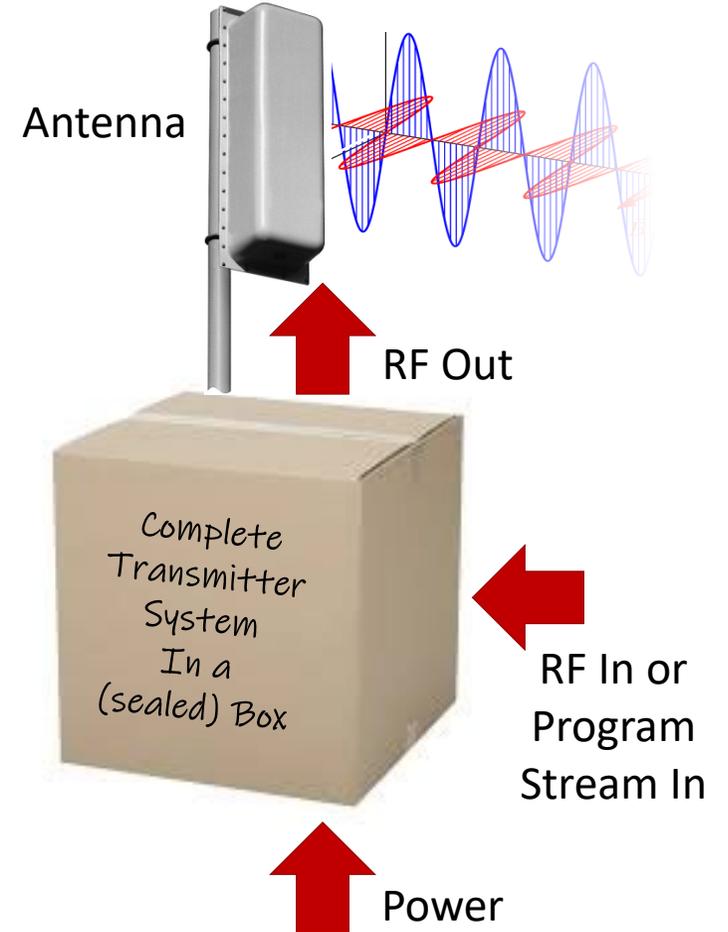
**VIRTUAL**  
events



**PMTX-1**  
**OUTDOOR**  
**TRANSMITTER**



- Why an outdoor transmitter?
  - Breaking the normal Broadcast tradition
  - A complete "Transmitter in a box" concept
  - Well-proven in other industries (cellular)
  - No building, no indoor lease space
  - Save \$\$, lower TCO
  - Fast & easy to deploy
  - Can make a great alternative solution for the lowest power level transmitters, repeaters



# IT'S NOT A TOTALLY NEW CONCEPT



*Courtesy Vanu Inc.*

## Low Power Cell Tx (Vanu)

**Efficient transmitter:** This 50-watt (power consumption) unit is the lowest-power outdoor cell-phone base station in the world, according to an analysis by its maker.

## Examples of outdoor transmitters



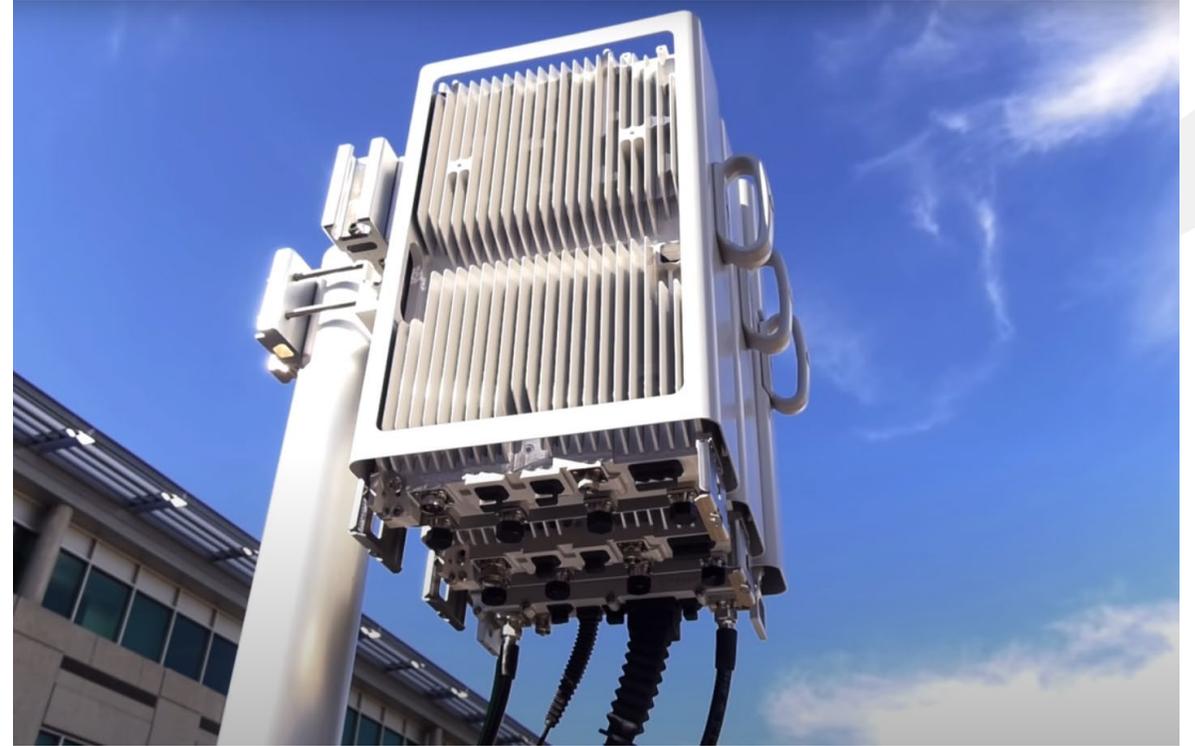
*Courtesy Samsung Group*

## Cellular Base Station Tx (Samsung)



## Power Pole-mounted 5G Tx & Antenna (Unknown Brand)

# EXAMPLE OF OUTDOOR TRANSMITTER



## **NOKIA AirScale Base Station 4G/5G Radio**

AirScale Radios come in single-band and dual-band versions, as well as the world's first triple band radio. These compact radios offer the lowest total cost of ownership by providing various advanced features.

*Courtesy Nokia Corporation*

## Climate Considerations

- Temperature
  - Stable operation over a very wide temperature range
  - Start-up in extremely cold conditions
  - Solar heating considerations
  - Extended maximum and minimum temperature range for extreme conditions
- Moisture
  - Ability to operate in very wet locations
  - 100% sealed unit needed
- Corrosion/Pollutants
  - Operation in poor environmental conditions – salt, chemicals, dust, pollen, etc.



116°F = +47°C



-38°F = -39°C

# OUTDOOR TRANSMITTER DESIGN (2)



## Reliability & Maintenance

- ✓ Very high reliability - minimize site visits
- ✓ No routine maintenance needed
- ✓ Modular – easy to swap parts



## Efficiency

- ✓ High as possible
- ✓ Save energy – Lower TCO
- ✓ Less heat to manage - easier to cool



## Flexibility

- ✓ Configurable as a Transmitter, Transposer or SFN Repeater/Gap-Filler
- ✓ Input Flexibility – ASI, TSoIP, Off-Air Receiver, Sat Receivers + Remux
- ✓ Standards Flexibility (UHF/VHF, DVB-T/T2, ISDB-T, ATSC, Analog)

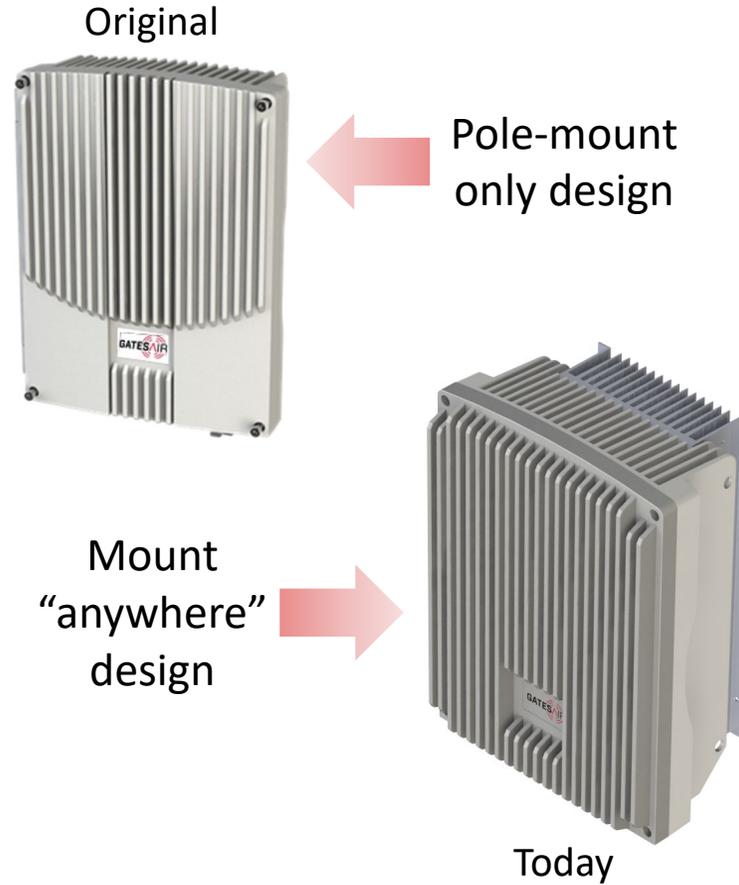
# PATH TO THE FINAL DESIGN

## Initial Design



### POLE-MOUNT TRANSMITTER

- Pole-mount only design
- Heat mostly dissipated directly to suitable metal pole
- Adapter plates for different pole sizes and tower structures
- Tested and proven design
- Limitation of pole-only and variations in cooling ability considered as “less than ideal”



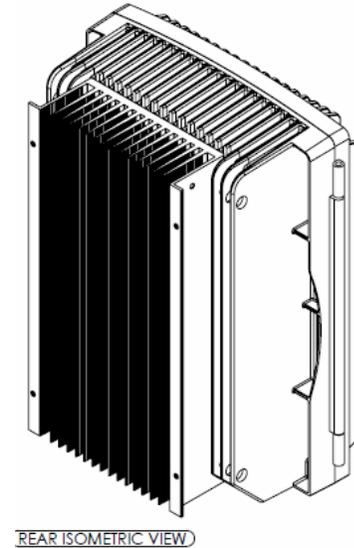
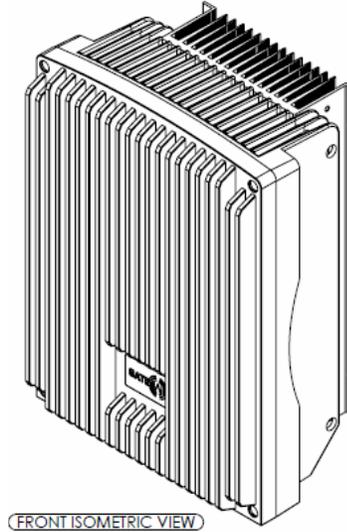
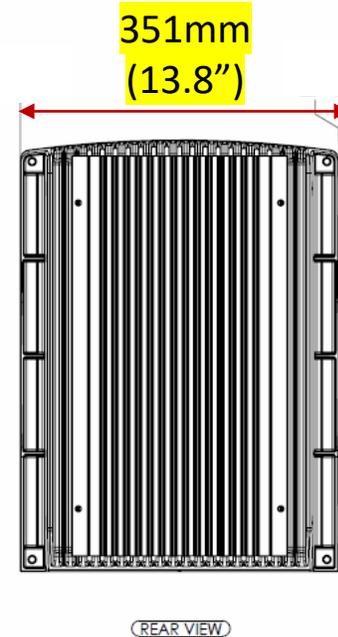
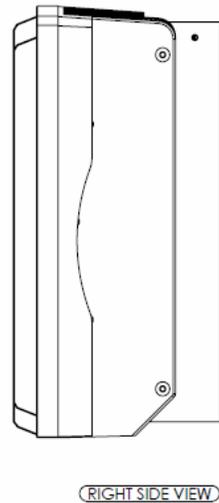
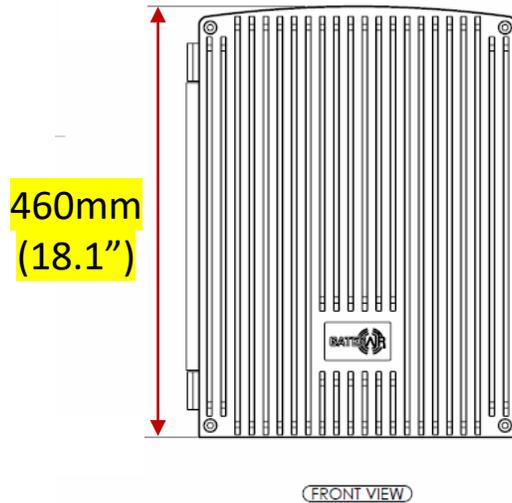
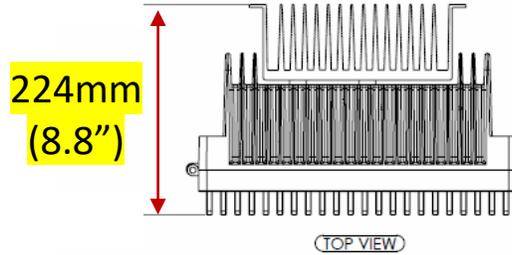
## Final Design



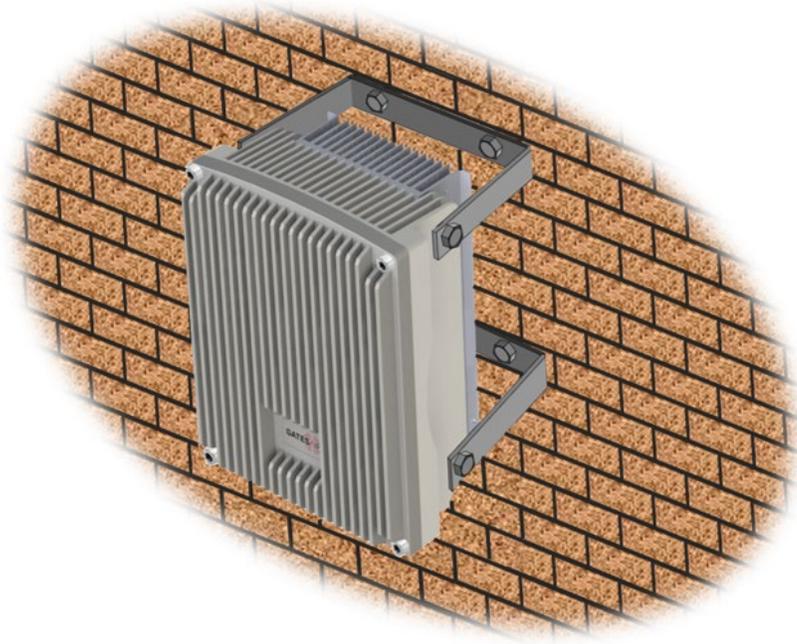
### OUTDOOR TRANSMITTER

- Mount on any suitable structure
- Waste heat dissipated via heatsink fins
- Simple bracket designs for pole, mast, wall mount, etc.
- Versatility in terms of mounting location vs. pole-mount only
- Available to order now

# MECHANICAL DESIGN



# INSTALLATION FLEXIBILITY!



Wall / Side of Building



Tower/Pole Mount



Top of Building

- Basic Configurations
  - Transmitter / Transposer / On-Channel Gap Filler
  - Integrated Mask Filter
  - Up to 50W TPO average DTV after filter
    - or 100W Analogue
  - Modulations: ATSC-1, DVB-T/T2, ISDB-T, Analogue
  - GPS - Option
- Inputs & Options
  - 1 x TS (BTS / ASI / SMPTE-310M) + 1 x GbE (TSoIP) - Included
  - Off-Air Receiver (Regenerative or Direct Conversion) - *Option*
  - Up to 4 x Satellite Receiver DVB-S2/S2X - *Option*
  - Remux (combines programs into 1 stream) – *Option*
- Power source
  - External DC: 36V to 72V
  - External AC to DC Power Supply - *Option*



**Maxiva™ PMTX-1**  
Low-Power UHF/VHF Outdoor  
Transmitter / Transposer / Gap Filler



GatesAir's new Maxiva™ PMTX-1, is a complete self-contained, outdoor transmitter system. Housed in a completely environmentally sealed enclosure, the PMTX-1 includes many options, allowing configuration flexibility for many applications. The unit is capable of being configured as a Transmitter, Transposer (Translator), or an On-Channel Gap-Filler. Waste heat is efficiently dissipated via the metal housing and heatsink. This allows the unit to be mounted on a variety of structures, including tower, legs, poles, or building walls. For regions with extreme climate conditions, options for ambient air temperatures up to +50°C (122°F) and down to -40°C (-40°F) are available.

The compact dimensions (351W x 224D x 460H mm) of the Maxiva PMTX-1 chassis are key to this unique design, allowing installation on a wide variety of outdoor poles, or mast structures. Access is via a lockable and sealed door. The sealed metal housing of the PM-TX-1 has been engineered

to remove heat efficiently from the internal circuitry. The unique design of the PMTX-1 provides a high level of installation versatility, allowing it to be installed on virtually any suitable outdoor structure.

This versatile unit does not require a building, shelter or any additional outdoor enclosure. The totally sealed metal case has been designed specifically for outdoor environmental conditions, providing protection from all humidity levels, precipitation and wide temperature extremes.

The unit can be configured and operated as a 50W digital / 100W analogue transmitter, transposer or an on-channel gap-filler, with various input options. A satellite receiver card with CAM slot is also available. The unit includes an internal mask filter. The external power source requirement is 36-72 VDC (positive or negative).

**Product Features**

- Compact chassis: 351W x 224D x 460H mm
- Outdoor, pole-mounted, using adapter plate
- Output Power (Post-Filter): 50W rms Digital or 100W analogue
- Input interface options:
  - ASI, BTS, T2MI, SMPTE-310M, ETI
  - Gbe port (TS over IP)
- DVB-S/S2 Satellite Receiver input (including CAM interface). 4 slots available.
- RF receiver input for Transposer/Gap-Filler configuration (Direct Conversion – zero IF)
- Regenerative receiver input option for Transposer
- Supports DVB-T/H, ISDB-T/Tb, DVB-T2, ATSC & Analogue modulations
- Embedded Re-Multiplexer/Layer Combiner/TS to BTS (188 to 204 byte) converter for ISDB-Tb
- Adaptive pre-correction circuits
- Optional High stability GPS / GLONASS receiver with battery
- SNMP, Web Interface and Touch Screen display
- RF combiner option for multiple transmitter systems

Connecting What's Next
+1.800.622.0022
www.gatesair.com

- Environmental
  - Ambient air temperature range:
    - -20°C to +45°C (standard)
    - -40°C to +50°C (optional)
  - Weatherproof, sealed enclosure
- Performance (Adaptive correction is included):
  - MER ≥ 34dB
  - Shoulders ≤ -37dB
- Remote Control
  - GPIO (parallel remote)
  - Full-featured HTML-5 Web Remote GUI
  - LTE Module (option)

## Maxiva™ PMTX-1 (preliminary specifications)

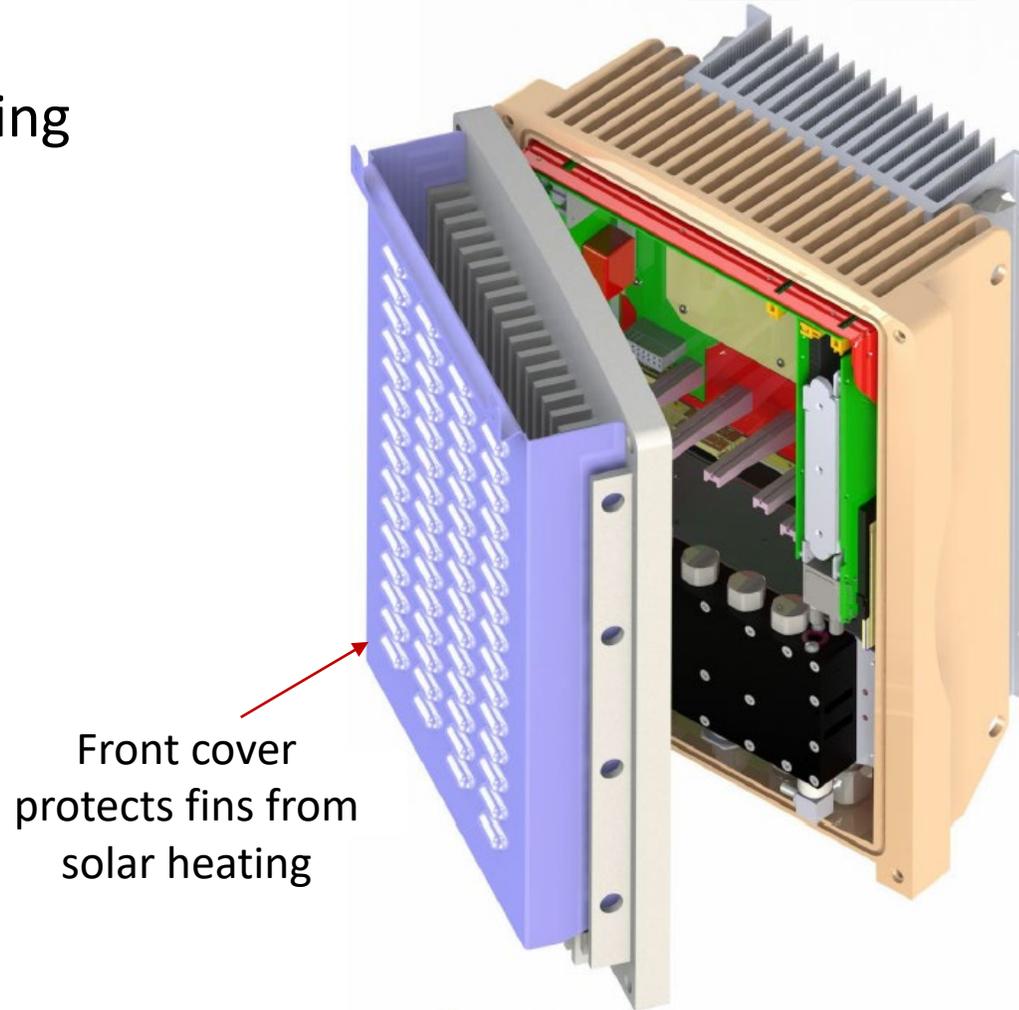
### Specifications

Specifications and designs are subject to change without notice

General	
RF Output Frequency Range	PMTX-1-U: UHF Band, 470-810MHz PMTX-1-V: VHF Band III, 170-240MHz
Transmission Standards	ATSC, DVB-T, DVB-T2, ISDB-Tb, Analogue
RF Channel Bandwidth	6, 7 or 8MHz
Number of Transmitters per Unit	1
RF Power Output per Transmitter	At output of integrated filter: 50W average DTV, 100W analogue p.s.
VSWR Protection	Included
Mechanical Dimensions	351W x 224D x 460H mm
Power Supply Configuration	External DC power source, connected to bottom of unit.
Power Supply Voltage	DC: 36 to 72V
Remote Control	GPIO and Web Remote with SNMP
Pre-correction	Real Time Adaptive
Input Options (per tx module)	
RF Input	1 input - Type N (f) connector, 50 ohms
ASI/BTS/T2-MI//SMPT-310M/ET1	1 input BNC (f), 75 ohms
GbE Port (TSolP)	1 input RJ-45
DVB-S/S2 Satellite Receiver	1 input Type F, CAM slot included, with Multi-Stream capabilities
Environmental	
Operational Temperature Range	Standard range: -20°C to +45°C Option 1: -40°C low ambient temperature option Option 2: +50°C high ambient temperature option (Both options may be selected)
Relative Humidity	0 to 90% non-condensing
Altitude	Up to 2,500m AMSL. Derate max. temperature 2°C per 300m of elevation. > 2,500m on request
Cooling Method	Via thermal conduction to suitable metal pole/mast and via radiation from housing. Contact Gate-sAir for more information.
Acoustic Noise	< 65dBA
DVB-T/T2 Transmitter Performance	
Standard	EN300744, EN302304, EN302755, TS101191, TS102773 (T2-MI), TS102034
Power Output Stability	0.5dB
RF Load Impedance	50 Ohms
Operating Load VSWR	Up to 1.4:1
MER	≥ 34dB
Shoulder Level	≤ -37dB
Spurious and Harmonics	-60dBc (After mask filter)
Channel Bandwidth	6-7.8 MHz
FFT	1K (DVB-T2), 2K, 4K, 8K, 8K ext. (DVB-T2), 16K & 16K ext. (DVB-T2), 32K & 32K ext. (DVB-T2)
Code Rate	All modes available according to the standard Block Short or Normal (DVB-T2) DVB-T: Reed-Solomon (204, 188) DVB-T2: BCH, LDPC
Guard Interval	1/32, 1/16, 1/8, 1/4, 19/256 (DVB-T2), 19/128 (DVB-T2), 1/128 (DVB-T2)
Constellation	QPSK, 16QAM, 64QAM, 256QAM (DVB-T2). Rotated and non-rotated (DVB-T2)

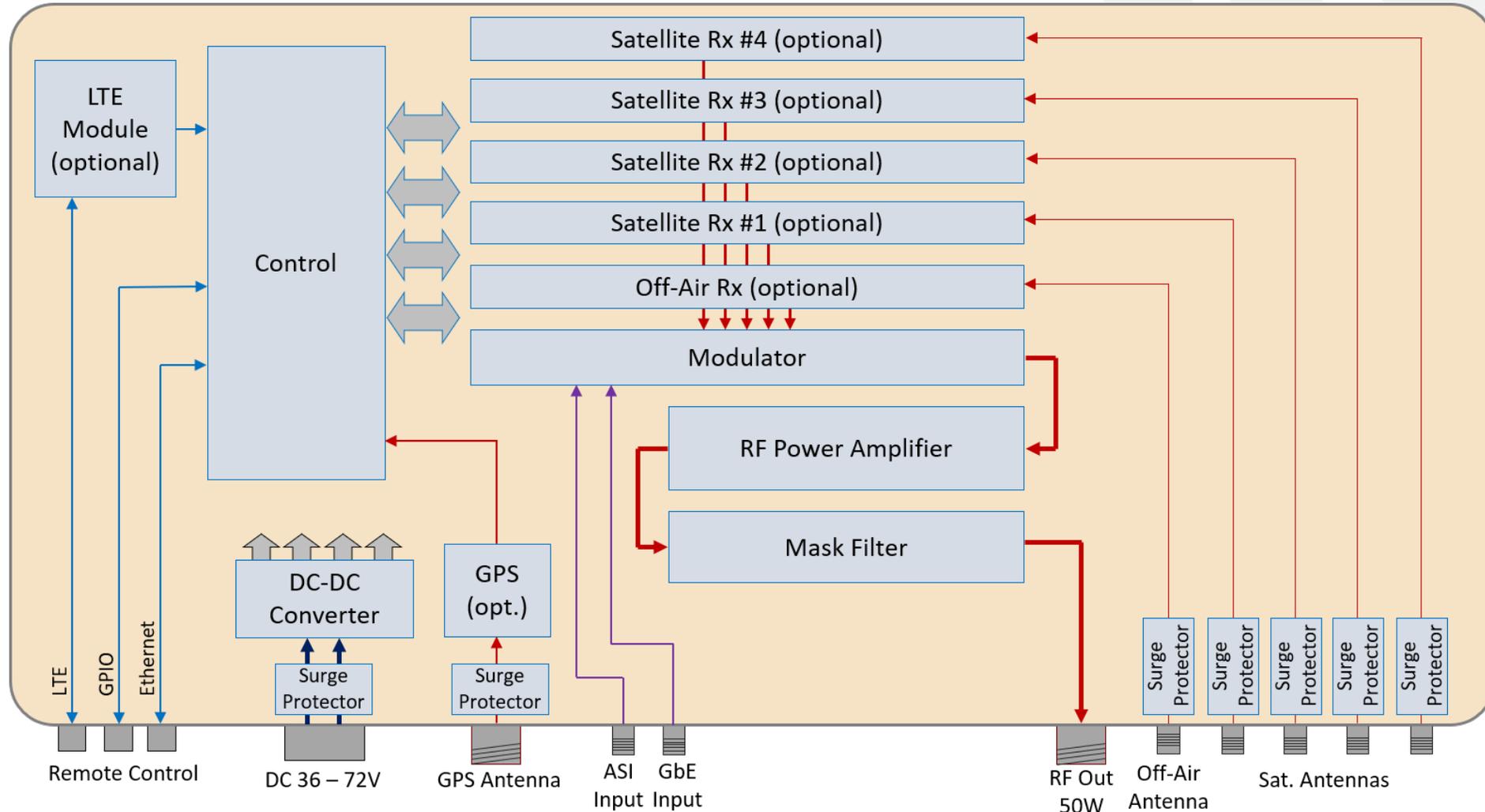
# SOLAR SHIELDING FOR HIGH TEMP REGIONS

- Front cover provides solar shielding
- Lower temperature heat sink
- Improves convection cooling



Front cover  
protects fins from  
solar heating

# PMTX-1 BLOCK DIAGRAM



# TWIN TRANSMITTER VERSION COMING SOON

- In design phase – A 2 x Transmitter version for applications where 2 systems are needed in same location.
- Same features, slightly larger case size
- Both have integrated mask filters



Photo's at GatesAir SRL, Brescia, Italy – Feb 4<sup>th</sup>, 2020

GATESAIRCONNECT  
**VIRTUAL**  
events



**IMTX-70**  
**COMPACT / PORTABLE**  
**MULTI-TRANSMITTER**

---

# IMTX MULTI-TRANSMITTER

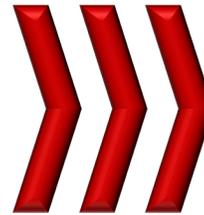
- Compact and portable
- Up to 6 separate transmitter modules
- Output power: 70W rms per module (Pre-Filter)
- Several Input interfaces for each transmitter module:
  - 1 x ASI input (ASI, T2MI, SMPTE-310M)
  - 1 x Gbe input (TS over IP)
  - Optional: DVB-S/S2 Satellite Receiver input (including CAM interface and multi-stream capabilities)
  - Optional: RF receiver input for repeater/gap-filler configuration



# ONE CHASSIS VERSUS SIX



(6) x 482.6 x 43.6 x 470mm  
(6) x 19" x 1.75" x 18.5"



230 x 485 x 320mm  
9.1" x 19.1" x 12.6"

# IMTX-70 DETAILS

DC Power Supply

AC Power Supply

Controller with GPS Rx

Tx Module # 1 - Sat In + ASI + GBE

Tx Module # 2 - Sat In + ASI + GBE

Tx Module # 3 - Sat In + ASI + GBE

Tx Module # 4 - RF In + ASI + GBE

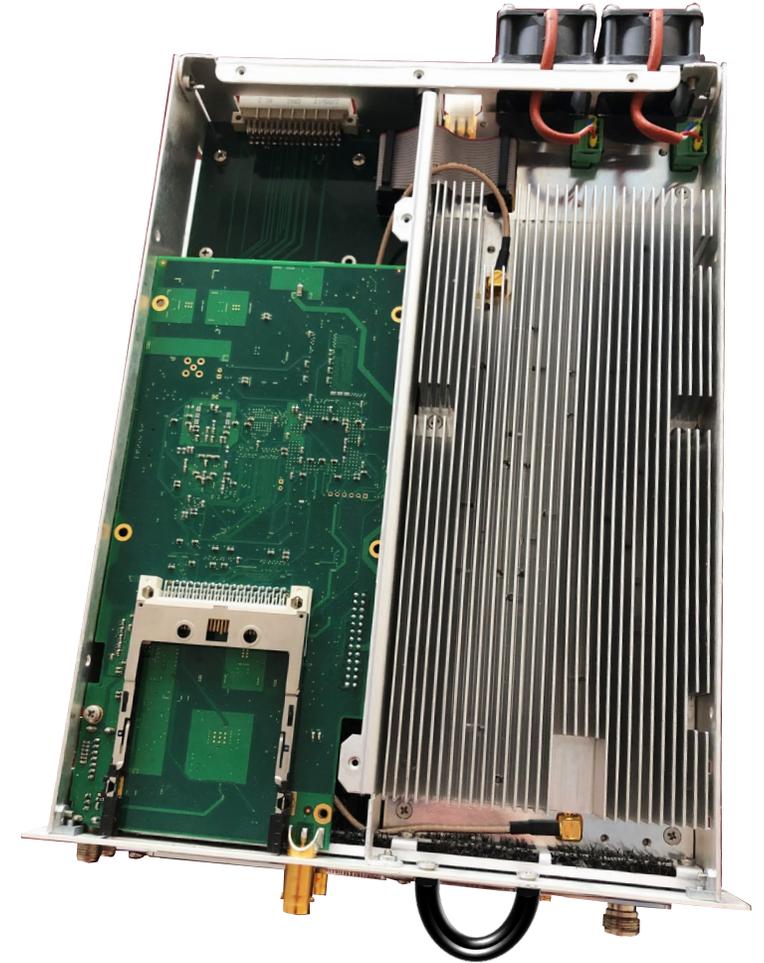
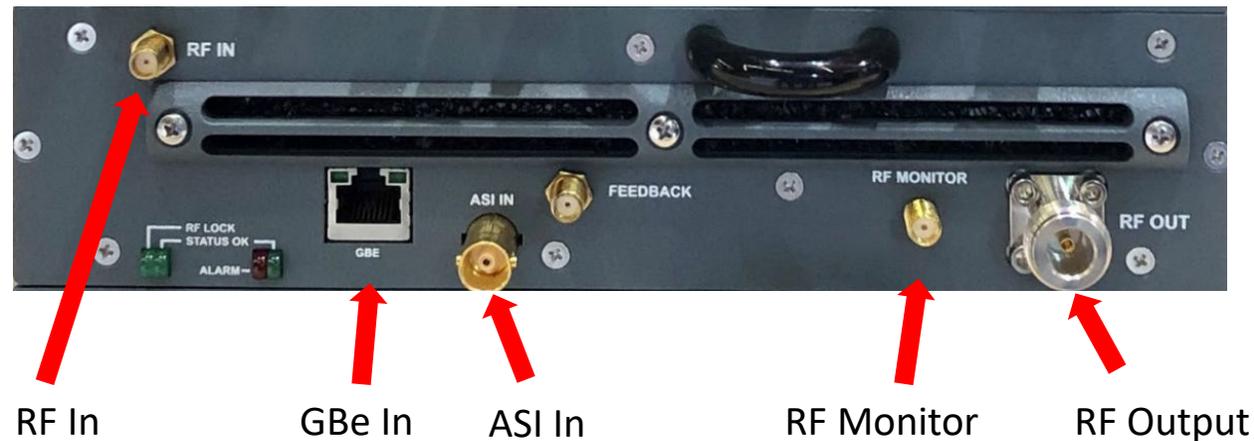
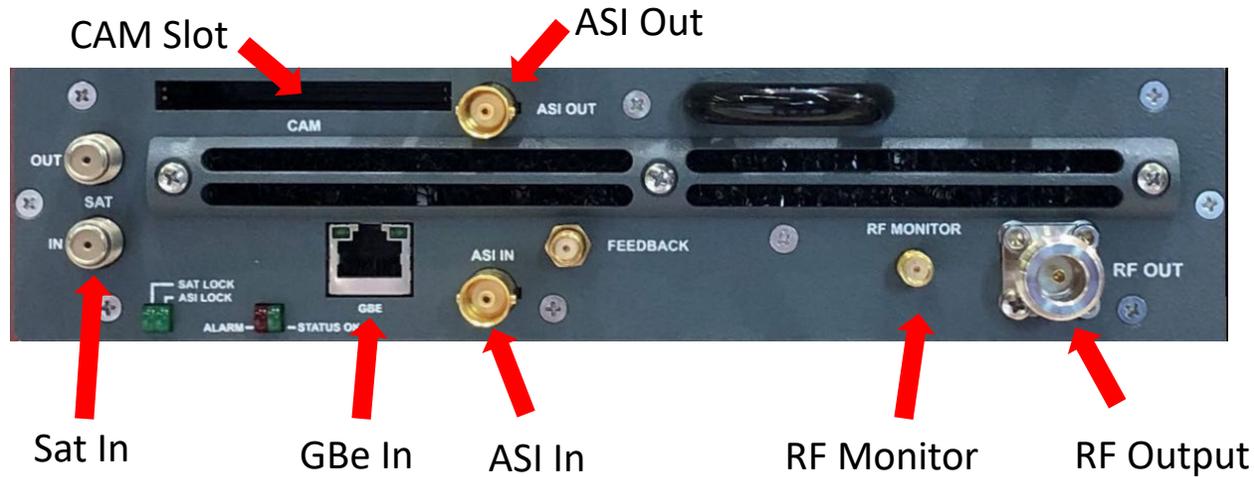
Tx Module # 5 - RF In + ASI + GBE

Tx Module # 6 - RF In + ASI + GBE



- 1 Power supply included (AC or DC)
  - 2<sup>nd</sup> Power Supply optional
  - 100% Redundancy
- Can be AC or DC (36V -72V)
- 1 to 6 Transmitter Modules
- Each includes 1 x ASI + 1 x GbE (TSoIP)
- Options:
  - Add Sat Receiver (inc. CAM slot)
  - Add Off-Air Receiver for Transposer/Gap Filler
  - GPS

# IMTX-70 TX CARDS



# IMTX-70 INSTALLATION VERSATILITY

Outdoor



“Intra” Mast

Outdoor



Inside an Outdoor  
Enclosure

Indoor



Tabletop / Desktop

Portable



Portable / Transportable

**THANKS FOR JOINING TODAY'S EVENT!**



# THANKS FOR WATCHING QUESTIONS?

More Upcoming Virtual Events: <https://go.gatesair.com/virtual-events.html>



Martyn Horspool  
Product Manager, TV Transmission  
[martyn.horspool@gatesair.com](mailto:martyn.horspool@gatesair.com)

