

Addressing Frequently Requested Requirements

1. Addressing FCC spectrum challenges: The GTX Wireless Microphone System operates via a completely digital UWB TDMA on-off-keying method at 6.5GHz. It provides operation which is entirely immune to both current and future FCC UHF spectrum grabs. The 600MHz auction, and the upcoming 500MHz re-pack crowding are the current challenge. However, congress' latest proposed bill, the "Mobile Now Act" (sent to senate on 3/21/17) requests an additional 255MHz of spectrum below 6GHz should be made available for re-purposing. Our system currently works at 6.5GHz. We will have more "operating blocks" available between 6.5GHz and 10.1GHz. This is the least "used" spectrum both currently and into the future. The next IoT, cell, and other wireless services have already move up above 20GHz. The region we have chosen to operate will remain the least affected by densification.
2. Replacement of high channel count Mic systems in a campus or multiple studio location:
 - a. Because the GTX Wireless System allows studio-to-studio or space-to-space operation, replacement of any # of mics – up to 24 in a single space is not a problem. It can be accomplished "immediately" without any concern for coordination or interference.
3. Protect Mics now operating in allowable UHF and expanded STL bands: Operation of the GTX system will help to PROTECT any legacy or additional traditional wireless systems operating in the UHF or expanded STL bands.
4. Flexible digital operation: The GTX Wireless Mic System utilizes an entirely digital method (not a hybrid which includes a digitally-modulated continuous carrier wave) immediately from mic input conversion on. This allows the system to be far more efficient, flexible and reliable than other systems which "use" digital.
5. High mics/TV channel – DENSITY: - The GTX system does not work in TV channel spectrum. No matter the number of TV channels (or other wireless mics, comms, IFBs, IEMs present) up to 24 GTX24 transmitters can be used in a single space, and this may be repeated as many times as needed throughout a facility.
 - a. There are no operating modes needed – such as high or low power. The operation of each TX is always exactly the same.
 - b. The entire system latency maximum is 2.7ms, including the over-the air transmission. Don't be fooled by equipment specs of sub 3ms latency that don't include the entire chain.
 - c. The transmitter output power is 4nW (yes, average nano watts)
6. Frequency agility: The system is not frequency agile, as there are no frequencies to coordinate. However, in order to use more than 1 system in a *single* space, additional "operational blocks" will be added which allow additional GTX24 transmitters and additional GTX32 transceivers to be co-located.

7. IP interoperability: The GTX Wireless Mic System does not offer analog outputs since we found that most facilities have preferred analog break-out boxes. Instead, the system offers MADI via BNC, single or multi- mode fiber, and DANTE/AES67 via Brooklynn II.
8. Monitoring functions with signal strength, battery life, antenna(s) in use, and audio level:
 - a. A full array of signal quality monitoring is available at both the main control unit screen and the companion computer control interface. Due to the entirely digital nature of the system, an additional useful measurement for ensuring good quality of service is BER. The GTX Wireless Mic System utilizes three layers of error correction as well as a many-way (correlating to the # of GTX32 transceivers) digital diversity method. BER, battery life, link, and audio can be monitored in several locations throughout the system. Correct system operation can be logged and time-stamped for 31 days and it can also be used to track emerging cable failures in CAT-5 connections should they be occurring.
 - b. Battery life is display via minutes available for operation, and a user-definable “level warning” is available.
 - c. The GTX systems shows all GTX32 transceivers connected to the system at all times. It also displays whether or not those GTX32 transceivers are fully linked, and of course, their BER over time is tracked. There are actually a number of different/additional receiver performance test modes available in order to ensure that each GTX32 in use is functioning as efficiently and effectively as possible.
 - d. Audio-level is shown and adjustable via GAIN display at the GTX3224 Main Control Unit and on each GTX24 beltpack. This level is able to be set and pushed from either location.
9. Rechargeable: The battery compartment is designed to accommodate standard AA as well as rechargeable batteries. Our system does not re-charge the batteries.
10. High quality U.S. Manufacture: This is a U.S. designed and produced product. Production takes place either in San Jose, CA or at the ETL-approved Alteros facility in Stow, OH.
11. Operating in hostile RF conditions: This equipment was designed specifically for operation in high RF noise floor, or highly congested RF environments.
 - a. It is completely immune to any TV band signals.
 - b. It is also immune to interference from LED/Video monitors (a common source of interference to traditional wireless gear).
 - c. It has already been proven multiple times top operate without any need for coordination in highly congested urban areas.
 - d. **IMPORTANTLY** – use of this system actually **CLEANS UP** spectrum and RF noise floor when utilized at a facility/location.
12. User-friendly transmitter: The GTX24 transmitter is a lightweight beltpack constructed from Aluminum and ABS. It utilizes an internal circularly-polarized cross-dipole antenna in order to eliminate the need for inconvenient external or whip antennas. The microphone connector is “LEMO,” and the GTX24 is available in either 2-wire or 3-wire

configurations in order to allow for any existing microphone preference. Its dimensions are 60mm x 98mm x 20mm. It includes a highly robust and low-profile wire belt-clip. A dual-character display which can be visible continuously (for use during set-up) is “off” during use to avoid any possible on-camera issues. The GTX24 beltpack features 5 soft-touch buttons which can be utilized to set “System ID” (a specific location tether), Channel (this define the TDMA slot for the microphone to transmit) and Gain. Controls are simple, but also protected in order to prevent any “accidental” changes. The on-off power switch is internal to the unit to further prevent any unwanted operational changes. Audio frequency response is 20 – 20,000Hz and latency is 2.7ms. There is no compander to interfere with the excellent sound quality of the transmitter.

- a. The GTX handheld transmitter will be available with an industry-compatible interchangeable capsule mount so that specific microphone preferences may be addressed.
13. Integrated talkback/Mute function: On-board Mic mute, re-route is accomplished with the 3-wire version of the GTX24 transmitter. An in-line soft-touch switch re-routes main audio signal to an additional 24 channels (definable in MADI or via the companion software tool) for talk-back or cough operation. The talk-back channels can be easily grouped in multiple configurations via the included companion software tool.
14. The GTX system components which are currently available are as follows:
- a. GTX3224 Main Control Unit
 - i. Available in 8 channel, 16 channel and 24 channel audio output versions
 - b. GTX32 Transceiver
 - c. GTX24-2 Beltpack transmitter for 2-wire mic operation
 - d. GTX24-3 Beltpack transmitter for 3-wire mic operation
 - e. GTX899 omni directional lavalier microphone with LEMO connector
 - f. GTX899SW omni directional lavalier microphone with in-line talk-back switch, LEMO connector
 - g. SWX8 – 8-port CAT-5 switch, failover and routing
 - h. SWX8C – 8-port CAT-4 switch, failover, routing and control

Components that are in-process for near-term production

- a. Handheld transmitter – early 2018
 - b. Instrument version of GTX24 - early 2018
 - c. Additional operating block (up-band) – early 2018
15. Remote monitor and control: Supporting monitor and control software consists of an included powerful companion software control, monitor and logging tool, plus an additional software control platform for use with the SWX8 and SWX8C switches which can be used to configure specific channels of redundancy and zoning set-up for complex spaces and multiple system use.
- a. The included software companion to the GTX Wireless Mic System duplicates all monitor functions available at the GTX3224 Main Control Unit, for use from a remote location, but the tools do not stop there. Additional features include much more in-depth ability to turn GTX32 transceivers on and off individually, in-depth

time stamped BER performance reporting, creation of Talk-back groups, creation of “cue” groups (for use in multi-scene/show environments), and a 31 day logger which will report time-stamped (every 10 seconds) performance of every devices connected to a system, stored for up to 31 days. An especially useful feature of the remote software companion is the ability to see every CAT-5 cable connected to the system with its length and BER performance reported. Should a cable be exposed to conditions which cause it to become compromised, the BER warning will notify the user prior to a failure condition.

16. Priority service: A prioritized repair process is a given with the Alteros start-up team. There is no lengthy RA or service department or location to attend to. All repairs will be carried out either on-site (if this is most expedient and convenient) via a qualified Alteros engineer, or at the Stow, OH facility with no-charge overnight shipping. A full findings and action report will always accompany any repair. Repairs will be made same-day received, or if this is not possible, a substitute product may be supplied via our stock of on-shelf qualified replacement equipment.
17. Field support: Systemic integration process, or operational issues will be handled directly by Alteros design engineers, and usually on-site at the broadcast facility. This is a new technology and its use is different from traditional/legacy wireless. Our team of experts will be on-hand when needed to make sure that all operation is always exactly as desired.
18. Training: On-site support for installations will take place before, during and after installations. Training is an essential part of system success, and Alteros engineers will be on-site to carry out these tasks.
19. Communication access: Alteros does not have a 24-hour hotline. However, we are a small technology start-up and customers will have direct access to the engineers and management via cell and e-mails at all times.
20. Firmware and software upgrades: Formal written notification will happen for any software/firmware or needed hardware updates. The reason for change, the effects of change, and on-going benefits of the change will clearly spelled out. The period post software-firmware changes will also be a period in which Alteros engineers will maintain an elevated direct contact in order to ensure the transition is smooth and positive.
21. New bands: Operating in densely populated RF environments is the reason this system was designed. External factors will be monitored to ensure the proper functioning of equipment. Should additional 6 GHz products be developed and conflict with current operating block, (we currently co-exist quite well with a large amount of 6 GHz gear – an interesting topic which we are always happy to discuss) additional blocks are already in development in order to provide flexibility.
22. Continuous partner: Alteros’ goal as a technology partner is to work closely with customers to ensure that they have the latest RF spectrum information – not just the information related to Alteros-specific equipment. Alteros staff will be available for assistance in any RF decisions, and certainly on-hand should any building changes or special events require assistance.