

City of Arlington Texas Enhanced Radio Coverage Information

The current City of Arlington radio system is a digital, P25 800 MHz Phase 2, three site simulcast system with encrypted and clear talk groups.

In order to determine if a Distributed Antenna System (DAS) or Bi-Directional Amplifiers (BDA) system is necessary to meet the requirement for adequate radio communications for Public Safety first responders, Arlington requires building owners to have a radio signal strength and coverage analysis performed by a radio system engineer which provides a baseline Relative Signal Strength Indication (RSSI).

Signal level requirements for Arlington are as follows:

- A minimum inbound signal strength of -95dBm or 18 dB above the noise floor (whichever is more stringent).
- A minimum outbound signal strength of -95dBm and a DAQ of 3.4 shall be provided throughout the coverage area. DAQ score for audio quality is defined below.
- Critical areas, such as emergency command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, emergency and standby power rooms, and other areas deemed critical by the Arlington Fire Marshall shall be provided with 99% floor area radio coverage.
- General building areas shall be provided with 95% floor area coverage.

If the analysis report shows the in-building coverage meets the appropriate standard for RSSI, a report showing both Relative Signal Strength Indication (RSSI) and Delivered Audio Quality (DAQ) will be provided to the City of Arlington for review. This report must show the RSSI and DAQ for each floor of the building divided into a grid of 20 approximately equal test areas. Testing will be carried out in accordance with the Testing and Acceptance section of the current International Fire Code.

If a signal boosting system is required, written approval from the Arlington Fire Marshall is required prior to installation of the system. A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment may be required as specified in the International Fire Code Section 105.76. Signal boosters must not introduce interference or have an adverse coverage impact to the City of Arlington P25 radio system.

All Emergency Responder Radio Communication in-building radio systems shall be designed and installed in accordance to the current City of Arlington Fire Code, which is consistent with the International Fire Code and NFPA 1221 with the exception that signal strength and audio quality levels have been adjusted to meet the specific needs of Public Safety first responders in Arlington. Any system installed must comply with all applicable regulations including but not limited to, FCC 47 CFR Part 90.219.

For installation approval to be obtained, the building owner or their designee must submit a system design plan prepared by a licensed RF engineer that specifically documents the noise floor, potential interference, coverage impact, uplink/down link budgets and emission limits of the potential system. Link budgets shall assume the use of 3.2W portable radios and in areas accessible by vehicles (tunnels, garages) shall support both 3.2W portable and 19W mobile devices. Talk-out link budgets shall assume the radio is at hip level and talk-in at hip level. Talk-out link budget and Talk-in link budgets shall be balanced.

Link budgets shall be detailed and show losses for each DAS antenna, donor antenna, coupler, splitter, cable, as well as the gains for active components, both in the uplink (talk-in) and downlink (talk-out). The link budget shall be detailed enough the City can verify the signals at the inputs of the BDA and, if applicable, that the DAS fiber head-end and remote units are within the equipment vendor's specifications both on the uplink and the downlink.

Key points of the regulations are summarized in this document, but this document is <u>not</u> all inclusive. Building owners or their designee must refer to the current Arlington and International Fire Codes, pertinent building codes and NFPA 1221 for a complete list of requirements.

The system shall be professionally installed by personnel that at minimum meet the requirements of the International Fire Code Section 510.5.2 and have been trained and certified by the manufacturer(s) of the equipment being installed.

All in-building radio enhancement systems shall use a channelized BDA with one 12.5 kHz filter per frequency. The BDA shall be certified Class A by the FCC, be narrowbanded and have independent AGC/ALC circuits per channel with time slots for Time Division Multiple Access (TDMA). The system must be compatible and fully operational with both P25 Phase 1 and P25 Phase 2 for all Arlington channels.

No active components shall be shared between the public safety radio enhancement system and commercial and/or cellular systems. Passive components may be shared. Coax cables will be Plenum rated and have a low PIM rating. Vertical cables shall be in conduit or a riser. All cables, coax, fiber, conduit and risers will have a minimum of a two hour survivability. All connectors will be shielded.

The BDA enclosure hosting public safety shall solely host public safety components and be installed in cabinets meeting the requirements of the current fire code.

The system must be able to successfully operate to the audio quality standards in the presence of multiple simultaneous public safety portable radio transmissions (operating in "worst-case" locations) and be balanced to ensure that any negative "near-far" effect is avoided.

Once activated, a post installation engineering analysis validating that the final performance specifications meet those designated in the original approved proposal must be submitted for review. Discrepancies that cannot be resolved may result in a revocation of approval. The report must show the RSSI and DAQ for the building broken down in the same grid configuration as the baseline report.

As required by the FCC, the owner/operator of a repeater system must obtain authorization to transmit on frequencies from the entity they are licenses to. The City of Arlington is the FCC licensee of the public safety frequencies. Once the in-building system has met the requirements of the City of Arlington as verified by the Fire Marshall and the acceptance testing, the City of Arlington will provide the building owner an authorization to transmit on the Arlington frequencies. Until such authorization has officially been issued, the building owner is not authorized to transmit on Arlington frequencies. Temporary authorization for system validation and testing must be obtain in advance.

Arlington required frequencies which are used by all our public safety entities. Both uplink and downlink frequencies shall be repeated:

	<u>BASE</u> <u>TRANSMIT</u>	<u>BASE</u> <u>RECEIVE</u>
Ch. 1	859.7125	814.7125
Ch. 2	859.4875	814.4875
Ch. 3	858.7125	813.7125
Ch. 4	858.4875	813.4875
Ch. 5	857.7125	812.7125
Ch. 6	857.4875	812.4875
Ch. 7	856.7125	811.7125
Ch. 8	856.4875	811.4875
Ch. 9	855.1375	810.1375
Ch. 10	854.8125	809.8125
Ch. 11	853.2625	808.2625
Ch. 12	852.5625	807.5625

Statewide Interoperable frequencies:

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Repeater / Base Configuration						
Mobile Command Post Calling Channel Base	156.7	FB2T	851.0125	806.0125	8CALL90	
	156.7	FB2T	851.5125	806.5125	8TAC91	
la idad Tarana Rosada Charada	156.7	FB2T	852.0125	807.0125	8TAC92	
Incident Temporary Repeater Channels	156.7	FB2T	852.5125	807.5125	8TAC93	
	156.7	FB2T	853.0125	808.0125	8TAC94	

The in-building radio system shall be capable of modification or expansion in the event frequency changes are required by the City of Arlington, the FCC, another federal agency or in the case that additional frequencies are allocated to the City. The in-building radio system shall be expandable to operate on the Firstnet 700 MHz National Public Safety Broadband Network frequencies 758-768/788-798 MHz as the City of Arlington is currently utilizing Firstnet.

Donor sites:

Site Name	Site Address
Cooper	1529 Industrial Ct. Arlington, TX 76011
Curry	7080 Russell Curry Rd. Arlington, TX 76001
Lake Arlington	6100 Willard Rd. Fort Worth, TX 76119

BDA systems should target a signal received at the host site receiver equal to the noise floor plus 18 dB when transmitted from the edge of the cell (lowest received signal in targets area). All BDA transmissions must be limited to be received at City of Arlington sites below -45 dBm. Appropriate adjustments to the design to accommodate the adjusted gain values are the responsibility of the vendor.

DAQ Values:

DAQ Values	Subjective Performance Description	
1	Unusable, speech present but unreadable.	
2	Understandable with considerable effort. Frequent repetition due to noise/distortion.	
3	Speech understandable with slight effort. Occasional repetition required due to noise/distortion.	
3.4	Speech understandable with repetition only rarely required. Some noise/distortion.	
4	Speech easily understood. Occasional noise/distortion.	
5	Speech easily understood. Infrequent noise/distortion.	

Maintenance and Retuning Requirement:

The building/equipment owner, must have a service contract with a qualified vendor in place for the life of the equipment for technical maintenance, repair (including all components of the system), operation and troubleshooting in the event of radio interference involving the inbuilding radio coverage solution.

The radio enhancement system must be monitored in accordance with Section 510.4.2.5 of the International Fire Code.

The radio enhancement system shall be tested and inspected annually or when structural changes occur including additions or remodels that could materially change the original performance tests. Testing shall be in compliance of International Fire Code Section 510.6.1. A report that verifies the system remains in compliance with the original acceptance testing will be submitted annually to the to the Arlington system contacts.

System contact information:

Rhonda Shipp Communications Administrator 620 W. Division Street Mail Stop: 04-0380 Arlington, TX 76011 Office: 817-543-5912 Darin Niederhaus Fire Marshall 405 W. Main Street Mail Stop: 07-0100 Arlington, TX 76010 Office: 817-459-5528