



## Emergency Responder Radio Coverage

### In-Building Radio Signal Amplification System Standard

#### Document Type

Effective April 1, 2005, Montgomery County adopted regulations to require in-building radio signal amplification systems in certain buildings. The regulation was in the form of an amendment to the 2003 International Building Code.

These requirements have been maintained in the subsequent adoptions of the International Building Code. With the adoption of the 2009 International Building Code, the requirements for in-building radio signal amplification systems are found in Section 915 for Emergency Responder Radio Coverage. This section, as amended, reads as follows:

**Section 915.1.** Emergency responder radio coverage shall be assured in all new constructed below ground floors of a building, all floors in buildings greater than 25,000 ft<sup>2</sup> per floor, and to all floors of buildings greater than 3 stories in height. One- and two- family dwellings and townhouses are exempt from this requirement.

**Section 915.2.** Every floor area in a building or structure which can not achieve the required level of emergency responder radio coverage as established by Montgomery County Department of Technology Services shall be provided with an in-building public safety radio enhancement system in accordance with the Montgomery County Fire Safety Code.

**Section 915.3.** Inspection and Testing. Emergency responder radio coverage and in-building public safety radio enhancement system must be tested, and inspected by approved individuals. The results of the testing and inspection shall be certified to the code official prior to issuance of an occupancy permit.

#### Required Level of Signal Coverage:

The required level of signal coverage established by Montgomery County Department of Technology Services is:

- Signal measurement is required to be -95dbm or stronger at a given point;
- Entire building is 95% or above covered (including all underground levels, basements, elevators, stairways, etc.) at 95% of the time;
- An in-building radio signal amplification system is required to provide coverage at Delivered Audio Quality (DAQ) 3.4 level or above. DAQ 3.4 is defined as "speech understandable without repetition. Some noise/distortion present.";

Measurements shall be performed on frequencies listed in the Montgomery County Frequency Chart A. (Note: After the implementation of 800 MHz rebanding, Chart B will be used.)

## **Responsibilities:**

### **In Building Coverage System**

To amplify the signals inside a building or structure not meeting the above standard, an FCC type-accepted Bi-Directional Amplifier (BDA) with any of the following shall be installed in order to achieve the required radio coverage: a radiating cable system, a distributed antenna system, or a combination thereof.

### **Design**

It is the building owner's responsibility to obtain the services of a professional consultant to evaluate and test the required level of signal coverage in the building and to design and install (if required) the in-building radio signal amplification system. The in-building coverage design shall consider, but is not limited to, the following criteria: FCC limits on BDA output power, power per carrier, signal-to-noise ratio, RF filtering, adjacent band interference, intermodulation interference and distortion, uplink noise output, antenna locations, and proper cable size.

### **New Building Construction – System Installation**

Installation will be in compliance with all state and local building codes including the standards of the FCC, NFPA, NEC and TIA TSB-88-1-B. At a minimum, a two-inch diameter conduit/conduit sleeves will be provided vertically from the roof level to the lowest level of the structure. This conduit will provide a vertical path for cable to all levels and should pass through the BDA equipment room. At a minimum, a 20 amp AC circuit and building ground (at the BDA and outside antenna locations) is to be provided to power and ground the BDA. Two copies of complete formal BDA system reference drawings, including schematics, floor layouts with cable routing, and commissioning data are required to document the installed BDA system. The documents will be maintained by the building management and made available to the Fire Marshal or competent building inspectors on request.

### **Rebanding Capability**

The BDA provided shall include re-tunable or replaceable filters to accommodate pass band changes in support of the mandatory FCC changes within the 806-824 and 851-869 MHz bands. The use of non-adjustable and non-replaceable RF duplexer filters is prohibited.

### **UPS**

The BDA system shall be provided with 12 hours of secondary power either by battery or by an onsite generator. If there is a generator onsite, the generator shall provide power to the BDA system.

### **System Design and Initial Test**

System design and initial testing of the BDA system shall be performed by a qualified RF Systems Engineer with at least five years experience in the design, installation, and alignment of bi-directional amplifier systems.

### **Acceptance Test**

Using the Montgomery County Control Channel, each floor shall be RF signal mapped utilizing a calibrated portable spectrum analyzer. Each floor shall be divided into equal grids of no more than 50 feet by 50 feet. Individual testing points shall be spaced no farther than 50 feet from each other.

Each grid shall meet the downlink signal requirement as stated above. A maximum of two non-adjacent areas will be allowed to fail on the same floor. Failure of any two adjacent grids is considered a failure for the entire floor. All talk testing must pass the DAQ criterion stated above. Critical rooms, including, but not limited to, such areas as the Fire Command/Control Center, Fire Pump Room, Emergency Generator Room, stairwells with a standpipe, and other staging areas as identified by the Fire Marshal cannot fail coverage at all.

**Annual Test**

The building owner shall perform radio coverage testing annually to ensure that the in-building coverage system continues to meet the original acceptance test results and complies with applicable codes.

**Field Testing**

Emergency services personnel shall, with notice, have the right to enter onto the property to conduct field testing to be certain the required level of coverage is present.

**Performance and Maintenance Responsibilities**

The building owner is responsible for continued performance and maintenance of the in-building coverage system. In addition, the building owner is responsible for having the name of a contractor who can provide telephone support within 2 hours or recognition that the BDS system is not operating correctly or on-site service within 24 hours of recognition that the BDA system is not operating correctly.

**Costs**

The building owner is responsible for all costs to provide the required in-building coverage system, its design, and infrastructure to support the in-building coverage system.

**New Buildings Occupancy Certificates**

Prior to issuance of an occupancy certificate, a registered design professional must certify that the building achieves the required level of radio coverage as established by DTS. This certificate must be presented to the Division of Building Construction Services upon request and must be presented in the form established herein.

**Additional Information:**

For questions regarding in-building signal amplification system standard or signal coverage, you may contact the Department of Technology Services via phone at 240-777-5203 or email at [BDASStandardQuestions@montgomerycountymd.gov](mailto:BDASStandardQuestions@montgomerycountymd.gov)

Current Montgomery County Frequency Chart A

CHANNEL No.	Base Rx	Base Tx	CHANNEL TYPE
1	823.9375 MHz	868.9375 MHz	CONTROL CHANNEL
2	823.8875 MHz	868.8875 MHz	CONTROL CHANNEL
3	823.8625 MHz	868.8625 MHz	CONTROL CHANNEL

4	823.6875 MHz	868.6875 MHz	CONTROL CHANNEL
5	823.6375 MHz	868.6375 MHz	VOICE
6	823.6125 MHz	868.6125 MHz	VOICE
7	823.4375 MHz	868.4375 MHz	VOICE
8	823.3875 MHz	868.3875 MHz	VOICE
9	823.3625 MHz	868.3625 MHz	VOICE
10	823.2750 MHz	868.2750 MHz	VOICE
11	823.1625 MHz	868.1625 MHz	VOICE
12	823.1125 MHz	868.1125 MHz	VOICE
13	822.9125 MHz	867.9125 MHz	VOICE
14	822.8875 MHz	867.8875 MHz	VOICE
15	822.8375 MHz	867.8375 MHz	VOICE
16	821.6500 MHz	866.6500 MHz	VOICE
17	821.4875 MHz	866.4875 MHz	VOICE
18	821.3375 MHz	866.3375 MHz	VOICE
19	821.2750 MHz	866.2750 MHz	VOICE
20	821.2125 MHz	866.2125 MHz	VOICE

Future Montgomery County Frequency Chart B – Post Rebanding

CHANNEL No.	Base Rx	Base Tx	CHANNEL TYPE
1	808.9375 MHz	853.9375 MHz	CONTROL CHANNEL
2	808.8875 MHz	853.8875 MHz	CONTROL CHANNEL
3	808.8625 MHz	853.8625 MHz	CONTROL CHANNEL
4	808.6875 MHz	853.6875 MHz	CONTROL CHANNEL
5	808.6375 MHz	853.6375 MHz	VOICE
6	808.6125 MHz	853.6125 MHz	VOICE
7	808.4375 MHz	853.4375 MHz	VOICE
8	808.3875 MHz	853.3875 MHz	VOICE
9	808.3625 MHz	853.3625 MHz	VOICE
10	808.2750 MHz	853.2750 MHz	VOICE
11	808.1625 MHz	853.1625 MHz	VOICE
12	808.1125 MHz	853.1125 MHz	VOICE
13	807.9125 MHz	852.9125 MHz	VOICE
14	807.8875 MHz	852.8875 MHz	VOICE
15	807.8375 MHz	852.8375 MHz	VOICE
16	806.6500 MHz	851.6500 MHz	VOICE
17	806.4875 MHz	851.4875 MHz	VOICE
18	806.3375 MHz	851.3375 MHz	VOICE
19	806.2750 MHz	851.2750 MHz	VOICE
20	806.2125 MHz	851.2125 MHz	VOICE

# CERTIFICATE OF RADIO COVERAGE COMPLIANCE

Project Name: \_\_\_\_\_

Project Address: \_\_\_\_\_

Building Permit Number (A/P): \_\_\_\_\_

Design Professional Engineer of Record: \_\_\_\_\_

I have responsible charge and I certify that the building identified above was tested for radio coverage level(s) in accordance with the Montgomery County Department of Technology Services (DTS) standard. To the best of my information, knowledge and belief, the radio coverage levels for this project is in accordance with the specifications and is in compliance with DTS standards and regulations.

Professional Certification. I hereby certify that these documents were prepared or approved by me, and I am a duly licensed professional engineer under the laws of the State of Maryland, License No. \_\_\_\_\_, Expiration Date: \_\_\_\_\_.

Respectfully submitted,

\_\_\_\_\_  
Signature and Seal of Design Professional Engineer of Record

\_\_\_\_\_  
Date