Emergency Responder/ Public Safety Radio Enhancement Systems

Updated October 2014

Emergency responders need reliable communications wherever they work, including inside buildings. Section 510 of the 2012 Seattle Fire Code requires that certain buildings be provided with radio enhancement systems designed to provide radio coverage in areas of the buildings where signal strength does not meet minimum criteria due to building construction features and/or location. These radio coverage enhancement systems are also referred to as BDA (bi-directional amplifier) and DAS (distributed antenna systems). In this Client Assistance Memo, they are collectively referred to as BDA/DAS systems.

Additional information about radio coverage is available through the National Public Safety Telecommunications Council at: www.npstc.org/inBuilding.jsp

Section 1: Buildings Required to Have an Emergency Responder Radio Coverage System

1. All new high-rise buildings require installation of an emergency responder radio coverage system.

2. All new buildings that are more than five stories; or have total building area of 50,000 square feet or more; or the total basement area is 10,000 square feet or more; must have either an emergency responder radio coverage system or a wired fire department communication system in accordance with the Seattle Fire Code (SFC) Section 907.2.13.2. Where these buildings will pass radio signals through part of the building, emergency responder radio coverage need only be provided for those areas within the building that do not pass radio signals. However, if the wired fire department communication system option is selected, installation of the wired communication system throughout the building in accordance with SFC Section 907.2.13.2 will be required.

3. Buildings that are smaller than those described in item 2 above are exempt from the requirements of SFC Section 510.

4. Existing high-rise buildings that do not have a wired communication system or approved radio coverage for emergency responders within the building shall be equipped with such system or coverage by October 28, 2015; however, a wired fire department communication system in accordance with SFC Section 907.2.13.2 may be provided in lieu of an approved radio coverage system.

For information on wired fire department communication systems, see SFD Client Assistance Memo #5122 at: www.seattle.gov/fire/FMO/firecode/cam/5122CAM%20WiredSystems.pdf

Section 2: Working with the City of Seattle

During the design and installation of a BDA/DAS system, customers can expect to work with the City of Seattle’s Department of Information Technology (DoIT), the Department of Planning and Development (DPD) and the Seattle Fire Department (SFD).

Department of Information Technology Requirements

DoIT manages Seattle’s portion of the public safety radio system, commonly referred to as the King County Regional 800 MHz System. To ensure that BDA/DAS systems do not cause any harmful interference to the public safety radio system, building owners or their designees will be required to provide specific information about their BDA/DAS system and to coordinate system turn-up with DoIT. Building owners or their designees can request authorization using the “Request for Authorization: BDA/DAS Installation for In-
Building Public Safety Radio System Coverage” form, which is available on the SFD website: [http://www.seattle.gov/fire/fmo/firecode/cam/BDA-DAS%20Installation%20Authorization%20Request.pdf](http://www.seattle.gov/fire/fmo/firecode/cam/BDA-DAS%20Installation%20Authorization%20Request.pdf). Customers should complete items 1-19 on the form. DoIT will then complete items 20-24 and provide the information to the customer including the list of frequencies needed for the BDA/DAS system. Note that all DAS/BDA systems in Seattle are required to use a fully channelized Federal Communications Commission (FCC) Class A bi-directional amplifier unless a waiver is provided by DoIT and a non-channelized option is approved. Waivers are not routinely granted.

After the BDA/DAS system design firm, installing contractor, or other responsible party has completed installation of the BDA/DAS system, the building owner or designee must notify DoIT prior to turning on or activating the BDA/DAS system. Notification should be sent to DoIT by email at least five business days prior to the BDA/DAS system being activated for coverage testing. “Request for Authorization: BDA/DAS Installation” forms, notifications and other communication with DoIT related to BDA/DAS systems should be directed to BDA@seattle.gov.

Coordination with the DoIT Communication Shop is required before a new BDA/DAS system is turned on for the first time. A technician will typically monitor inbound radio system noise and signal levels at the donor radio site during this process. Customers should call the Communications Shop at (206) 386-1213 at least one week prior to initial system activation in order to coordinate this activity.

The City of Seattle Communications Shop can provide a small quantity of radios for post-installation testing. These are loaned out to qualified entities for one to two days of system testing prior to final SFD inspection. Requests to use these radios should be directed to the technician group. Please call (206) 386-1213 to reserve radios for testing.

SFC Section 510.5.3.8 requires that the building owner or designee send all final system documentation, including the system certification letter, to DoIT upon successful completion of coverage testing. The report shall verify compliance with SFD Section 510.5.4, and include the emergency responder radio coverage system equipment data sheets, diagram showing device locations and wiring schematic, and a copy of the electrical permit and system certification letter. Documentation should be sent to BDA@seattle.gov.

Department of Planning and Development Electrical Permits

BDA/DAS systems and associated battery or other backup power systems are required to be installed under a DPD electrical permit.

In order for DPD to sign off on the electrical permit, a system certification letter as described in SFC Section 510.5.3.8 must be completed and made available at the project site for the DPD inspector. For information on DPD electrical permits, visit: [www.seattle.gov/dpd/Permits/PermitTypes/Trade_Permits/Electrical_Permits/](http://www.seattle.gov/dpd/Permits/PermitTypes/Trade_Permits/Electrical_Permits/)

Seattle Fire Department Requirements

After acceptance testing is successfully conducted by the building owner and after electrical sign-off by DPD, SFD inspectors will conduct talk-back testing for selected areas of the building using SFD radios for verification of radio function.

To schedule an inspection, call the SFD Engineering Section at (206) 386-1443 between 8:00 a.m. and 9 a.m. Inspections need to be scheduled at least five working days in advance, however more notice is generally advisable given the high volume of construction inspection requests. SFD inspectors will also confirm functionality for the Seattle Police Department (SPD) radio channels, so there is no need for the customer to request separate testing from SPD.

Prior to scheduling SFD functional verification testing:

1. The building owner or designee shall submit a “Request for Authorization: BDA/DAS Installation” form to DoIT via email at BDA@seattle.gov.

2. DoIT shall provide frequency and other information to the building owner or designee. The BDA/DAS installation contractor or other responsible party shall perform and certify results of acceptance testing to verify proper performance of the system. System information and acceptance test results as described below, along with the certification letter, should be made available on site for SFD and DPD and emailed to DoIT at BDA@seattle.gov

3. The electrical permit shall be signed off by DPD.

Customers should ensure the following information is available on site for use by the SFD inspector:

LEGAL DISCLAIMER: This Client Assistance Memo (CAM) should not be used as a substitute for codes and regulations. Individuals are responsible for compliance with all code and rule requirements, whether or not described in this CAM.
1. A copy of the “Request for Authorization: BDA/DAS Installation” form submitted to DoIT.

2. Locations of the BDA/DAS system control equipment, amplifiers, signal boosters, backup battery systems, and any outdoor antennas.

3. Diagram for each floor where coverage is provided, divided into a grid of 20 approximately equal test areas, and include pre-test received signal strengths and frequencies for each test area. Indicate all critical areas where 99% coverage is required.

4. Copies of manufacturer specification sheets for all BDA/DAS systems components, including amplifiers, signal boosters, antennas, coax, couplers, splitters, combiners, filters, or any other passive components proposed. Include data sheets for the backup battery and charging system (if utilized), and include calculations to ensure the backup power requirements are met.

5. A certification letter stating that the BDA/DAS system has been installed and tested per code and that the system is complete and fully functional.

The above information shall be present at the subject property when the SFD inspector arrives and shall be maintained at the subject property for the life of the system.

It is the responsibility of the contractor to perform all acceptance tests and provide the necessary equipment for the tests. Acceptance testing and certification requirements are enumerated in SFC Section 510.5.3.

BDA/DAS system installations, acceptance testing, and annual inspection and testing are required to be performed or supervised by personnel meeting the minimum qualifications outlined in the SFC.

The minimum qualifications of the system designer and lead acceptance test personnel shall include:

1. A valid FCC-issued general radio operators license; and

2. Certification of in-building system training issued by a nationally recognized organization, school or a certificate issued by the manufacturer of the equipment being installed.

BDA/DAS systems are required to be inspected and tested annually or whenever structural changes occur including additions or remodels that could materially change the original field performance tests in accordance with SFC Section 510.6.

The occurrence of any fault in an emergency responder radio coverage system where the system function is decreased shall result in the transmission of a supervisory signal to a supervisory service. Systems that are out-of-service for more than eight hours require notification to the fire code official. To report an out-of-service system, visit: [www.seattle.gov/fire/FMO/confidenceTesting/CTForms/Seattle%20Fire%20Report%20of%20Impaired%20System%20FORM.pdf](http://www.seattle.gov/fire/FMO/confidenceTesting/CTForms/Seattle%20Fire%20Report%20of%20Impaired%20System%20FORM.pdf)

All relevant documentation for the BDA/DAS system, including the acceptance and annual maintenance test reports, must be kept on the building premises and be made available to the SFD upon request.

The 2012 Seattle Fire Code can be viewed at: [www.seattle.gov/dpd/codesrules/codes/fire/default.htm](http://www.seattle.gov/dpd/codesrules/codes/fire/default.htm)

### Federal Communications Commission (FCC) Registration Requirement

BDA/DAS system owners are required by the FCC to register their BDA/DAS system (which the FCC identifies as ‘signal boosters’) with the FCC. This applies to those systems already placed in operation, in permitting or under construction. The FCC Rule requiring registration is CFR 47, FCC Part 90.219(d)(5). Additional information may be found at: [http://wireless.fcc.gov/signal-boosters/part-90-boosters/index.html](http://wireless.fcc.gov/signal-boosters/part-90-boosters/index.html)

### Section 3: Planning for Technological Development

Federal and regional initiatives could lead to future technological change in the King County public radio system infrastructure. Building owners may wish to evaluate design options such that newly installed radio enhancement systems are forward-compatible and/or capable of being modified to accommodate technological development in the King County radio system, in order to allow maintenance of the minimum system design criteria. Ref: 2010 NFPA 72 – A.24.5.2.4.2.

### Nationwide “Rebanding” Effort

**Estimated timing: Q4 2014—Q1 2015**

The federal government has initiated a “rebanding” effort that reassigns spectrum to eliminate current...
interference issues between cellular carriers and public safety agencies in the 800 MHz band. This effort will modify the frequencies assigned to local jurisdictions for their public safety radio systems. In Seattle the transition will occur in late 2014 and early 2015.

Because operating frequencies for BDA/DAS systems are transitioning, customers requesting approval for a new BDA/DAS system during the transition will be provided with both the present frequencies and the post-rebanding frequencies when they submit a completed “Request for Authorization” form. The City of Seattle requires retuning of installed BDA/DAS systems in order to continue meeting requirements for public safety communications in structures.

**Replacement of Aging Analog Infrastructure with P25 Digital Infrastructure**

*Estimated timing: 2015-2020*

The public safety radio system in King County, including Seattle, is anticipated to be replaced with a P25 Phase II digital system in the 2015-2020 timeframe. The change is required because the current system is reaching the end of its service life. The channelized BDA/DAS systems installed in buildings in King County must allow for digital TDMA operation.

**Development of new nationwide broadband cellular public safety network**

*Estimated timing: 2022-2027*

In 2012, Congress passed legislation to start developing a nationwide, interoperable broadband cellular network for public safety. Congress set aside spectrum in the 700 MHz band for this broadband cellular network. If the network is built, first responder communications could evolve significantly over the next 10 to 15 years. The exact timing and implications for the King County radio system have not yet been defined. For more information on this initiative, visit: [www.ntia.doc.gov/category/public-safety](http://www.ntia.doc.gov/category/public-safety)