

PART 1 – GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the contract apply to this contract, including general and supplementary conditions and Division 1 specification sections.

1.2 SUMMARY

- A. The project requires a digital and analog television distribution system capable of delivering 134 EIA channels of RF over an installed network of Category 6/6A unshielded twisted pair cable. The system shall utilize a cable plant comprised of a TIA/EIA 568 compliant horizontal distribution system and a coaxial or single mode fiber backbone that delivers the RF to the telecommunication rooms. The system shall support bi-directional RF transmission.
- B. The television distribution system shall be capable of delivering analog, standard definition digital, or high definition digital programming to rooms in the main building and in remote buildings. The system components shall be installed in racks in the main equipment room and throughout telecommunication rooms in the building / campus. They shall be co-located with the existing Category 6/6A termination hardware to facilitate proper patching from the television distribution equipment to the patch panels. The contractor shall configure the system and place the components throughout the facility as required. After the installation is completed, the contractor shall test the system to ensure that it is fully operational in all areas of the facility.
- C. The contractor shall commission and test the system in its entirety. The commissioning includes connecting a live signal, powering up the amplifiers, installing ancillary equipment and documenting the picture quality.

1.3 WARRANTY

- A. The contractor shall warrant all equipment and materials, including wiring and cabling, for a period of one (1) year from the date of final acceptance of the system. The warranty shall conform to the standard manufacturer's backed warranty for each piece of equipment.
- B. Warrant against mechanical or electrical defects except when such defects are caused by misuse.

PART 2 – PRODUCTS**2.1 VERTICAL DISTRIBUTION PRODUCTS**

- A. The vertical distribution system shall consist of RG-11 coax cable, or .5" coax cable, or fiber optic transmitters and receivers distributing RF signals on single mode fiber optic cable.
- B. Approved manufacturers of fiber optic transmitters and receivers: Olson Technologies, Blonder Tongue.

2.2 HORIZONTAL DISTRIBUTION PRODUCTS

- A. The horizontal television distribution system shall consist of RF amplifiers followed by passive (unpowered) RF hubs and end converters. The hubs shall have a coaxial input signal and use RF balun technology to convert the 75 Ω unbalanced coaxial signal to a 100 Ω balanced signal appropriate for distribution on a twisted pair cable. The end converters shall also be equipped with RF baluns.
- B. All components shall be certified to comply with FCC Part 15 emission requirements.
- C. The hubs shall be available in 4, 8, 12, 16, or 20 port configurations, and be capable of delivering frequencies up to 860 MHz carrying NTSC, ATSC, or QAM television channels.
- D. The end converters shall have a passive design with a punchdown or RJ-45 input and an F connector output.
- E. The hub and end converters shall be capable of delivering frequencies up to 860 MHz.
- F. The hub and end converters shall have a DOCSIS and DOCSIS III return capability for video on demand and/or data applications.
- G. RF amplifiers shall be used to compensate for insertion loss related to the baluns and cable loss related to the twisted pair cable.
- H. All unused ports on the hubs shall be terminated with 100 ohm terminating resistors.
- I. Approved manufacturers:
 - 1. RF hubs and end converters: Lynx Broadband
 - 2. RF amplifiers: Blonder Tongue, Drake, ATX

2.3 SYSTEM RF CHARACTERISTICS

- A. Input levels at the inputs to the amplifiers: 13 dBmV \pm 3 dBmV
- B. Input levels at the inputs to the hubs: The manufacturer shall provide a system design showing recommended signal strength levels for the input to each hub. The installation shall conform to these recommendations with a maximum variation of \pm 2 dBmV.
- C. Output level at TV
 - 1. 0 dBmV to 15 dB for analog channels
 - 2. -10 to +10 for digital channels
- D. Composite triple beat (CTB): > 50 dB
- E. Composite second order (CSO): > 51 dB
- F. Modulation error rate (MER): > 32 dB

G. Carrier-to-noise ratio (C/N): > 43 dB

2.4 CAT 6 CABLE AND CONNECTIVITY

A. Cat 6 patch panels, cable, and connectivity provided by others.

2.5 TELEVISION SETS

A. Provided by others.

2.6 CABLES INSTALLED AT POINT OF USE

A. Appropriate cables shall be installed at the point of use to provide connectivity between the end converter and the TV. If a wall plate style balun is used the connection to the TV shall be an RG-6 coax cable of appropriate length. If an external balun is used, an appropriate Cat 6 patch cord shall connect the data jack to the external balun and a short coax jumper shall connect the external balun to the TV.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install fiber transmitters and receivers such that input and output signals are within the range specified by the manufacturer.

B. Install RG-11 or .5" coax riser such that the signal levels entering each IDF conform to the levels specified by the manufacturer of the RF hubs and converters.

C. Install RF amplifiers such that the input and output of the amplifiers conform to the levels specified by the manufacturer of the RF hubs and converters.

D. Install RG-6 coax between the amplifiers and the RF distribution hubs such that the input to each hub conforms to the levels specified by the manufacturer.

E. Install coaxial cables so as to avoid sharp bends or other physical distortions. All terminations shall be properly installed with no visible sign of cable braid between cable and the connector.

F. Maintain signal integrity. During installation, correct open grounds, broken shields, and other possible causes of poor RF integrity.

3.2 TESTING

A. On completion of the system installation, perform the following tests:

1. Use an RF signal strength meter to measure and record the signal strength at the output of each amplifier for both the highest and lowest channel being delivered. Record this

information, and confirm that the signal strengths are within ± 1 dB of the levels recommended by the manufacturer of the RF hubs and converters.

2. Within each wiring closet, measure the signal strength of the signal entering the Lynx hub serving the longest runs to the TVs for both the highest and lowest channel being delivered. Record this information, and confirm that the signal strengths are within ± 2 dB of the levels recommended by the manufacturer of the RF hubs and converters. Repeat this procedure for the hub serving the shortest runs to the TVs.
3. Using building drawings, visual observation, or TDR readings; determine which TV is the farthest away from each hub. Then observe the picture quality at the TV for both the highest channel and lowest channel being delivered. Document the room where the test was conducted and whether there was any pixilation or freezing on digital channels, or excessive graininess or “snow” for analog channels.
4. Provide advance notice to the owner or the owner’s representative a minimum of one week prior to testing so that he may, if he chooses, observe the testing procedure.
5. Send the test results to the owner or his representative. Include the name of the person performing the test, and the make and model of the test equipment used.

3.3 DEMONSTRATION / INSTRUCTION

- A. Schedule a time for system demonstration and instruction with the owner or his representative.
- B. Demonstrate proper operation of the system and review the system design materials provided by the manufacturer, including information on the recommended signal strength at each point in the network.
- C. Observe picture quality at several TV locations being served from each IDF closet.
- D. Provide the owner or his representative with at least one copy of the Installation and Operation Manual, the system design provided by the manufacturer of the hubs and converters, and the test results referenced in Section 3.2.

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