

Maximizing the Power of your AES-IntelliNet Network

A Best Practices Guide to Installing AES-IntelliNet Wireless Networks

AES-IntelliNet Wireless Mesh network's unique design allows alarm signals to be transmitted quickly and reliably over large geographic areas. Following the best practices for installation and deployment maximizes the connectivity and communication capability of your network. This document outlines a number of best practices based on customers' experiences and technical support questions received from customers worldwide.

Configuring the Network

1. **Antenna Positioning** – The greatest signal range is achieved when transceiver unit antennas are located higher in a building and/or more to the outside of a building. AES-IntelliNet transceiver units typically include a “Rubber Duck” antenna. This antenna generally provides 5-8 miles (8-13km) of radio transmission between AES transceiver units.
2. **Equalizing the Network Transceiver Units** – Avoid having any one transceiver be the only path between two or more other transceiver units to avoid creating a single critical path for radio transmission. An AES-IntelliNet network works best when the individual transceiver units can communicate with a number of other transceiver units. AES-IntelliNet technology will avoid the failures of tower-based systems with the application of planning and oversight.
3. **Line-Of-Sight** – AES-IntelliNet networks do not require line-of-sight for radio transmission, however line-of-sight provides greater distance capabilities.

Maximizing Radio Transmission Strength

1. **Measuring Signal Strength** – Verify the transceiver's signal strength at the installation site. There are two ways to determine the level of transceiver unit signal strength to the network. First, installers should be familiar with using the AES-IntelliNet Net7K network management software to determine the signal strength of individual transceiver units. Secondly, an SWR/Wattmeter is the best and fastest way to assess signal strength in the field. All installers should have access to a good quality SWR/wattmeter.
2. **Optimizing Antenna Location** – When positioning the antenna location of a newly installed transceiver unit, test for network connectivity and signal strength outside the building first. Once you know the signal connects to the network then locate the transceiver inside the building and check signal strength for optimum placement. This will allow you to know if the signal connects the site to the network at all, and if so, allows you to optimize the location within the site.
3. **Indoor Mounting** – Transceivers should be mounted indoors whenever practical for unit security and performance reasons. Outdoor locations can be subject to adverse weather conditions and tampering.
4. **Power Up Test** – When powering up the transceiver unit for the first time, be sure that the antenna is correctly connected and the battery is attached to avoid harming or destroying key product components.

Antenna Selection and Placement

1. **Central Receiver Antenna Type** – Use only Omni-Directional antennas rather than Yagi-Directional (direction focused) type antennas. Yagi antennas do not support the mesh networking operations as well as omni-directional antennas.
2. **Transceiver Antenna Type** – Transceiver unit antennas should be sized to communicate with multiple transceiver units. A larger antenna, placed higher than other transceiver unit antennas can result in a single communication path rather than multiple paths. The minimum sized antenna necessary should be used to get coverage so that it does not become a critical path of the wireless network.
3. **Central Station Antenna Locations** – These antennas should be significantly larger than the transceiver unit antennas and placed as high as possible so that they become visible to maximize transceiver unit communications.
4. **Antenna Ground Plane Installation** – All antennas smaller than 3 dB antennas should be mounted on a metal ground plane (such as the top of the subscriber box). The metal beneath the antenna provides a ground reference, which makes the antenna more efficient. Technical Support can provide information regarding proper mounting and application for specific antenna type.
5. **Avoid Antenna Interference** – Antennas should not be placed within 18 inches of metal objects (e.g. such as the metal support of a radio tower, metal conduit, HVAC ducts, railing, etc.) to avoid signal interference and reflections, which lower the effective power radiated. Metal objects can be below the antenna but never at its side.

Cabling/Connections

1. **Use Correct Cable Type** – Always use RG-58 or RG-8 cabling (high frequency), vs. RG-59 (CCTV) or RG-6 cabling, which is often mistakenly used. RG-59 or RG-6 has very different radio characteristics. Use of the wrong cable will severely limit range and can damage the transmitter.
2. **Connector Terminations** – Cable connectors should be terminated using a proper wire stripping and crimping tool rather than hand soldering the connectors. Incorrectly terminated connectors cause significant signal loss and are the number one source of signal problems in the field.
3. **Bending** – Cables should not be bent around corners or crimped along a cable run, but instead gently curved around since RF signal strength is curtailed significantly by bent or “hanked” cable. All bends should have at least a 6-inch radius.
4. **Service Lengths** – There should be little extra cabling (less than 12" for maintenance lengths) between the antenna and the transceiver since excess cable lengths create unnecessary signal losses. The maximum length of RG-58 to be used is 25 feet. For lengths between 25 and 100 feet, RG-8 may be used.
5. **Connector Types** – Any antenna other than the case mount or the stealth antenna, requires an N-style connector rather than the standard BNC-type connector. If RG-8 is used to connect to the transceiver unit, a patch cable (P/N 13-0346), which converts from BNC to N style, may be added to replace the existing BNC case mount antenna cable connection.