**Coaxial Cables**

**Why use Coaxial cables?**

Practically everything in our tech-driven society uses high-frequency very delicate electrical currents for communicating with each other. Transmission of these high-frequency signals through conventional pair of wires depend on the resistance, inductance and capacitance (or reactance) of the wires utilized.

Conventional pair of wires carrying these signals are exposed to external interference (from nearby signal carrying wires, running machines and lightening) and get distorted, termed as frying, cross talk and static noises. Conventional pair of wires also have a high "attenuation", that is, the signals get weaker as they travel along the wires for long-distance, and hence amplifiers are necessary to boost it up every few miles to maintain the signal above the noise level.

It is possible to transmit more than one signal of different bandwidths, simultaneously on a pair of wires by “frequency multiplexing”.

Conventional pair of wires have a relatively low bandwidth, i.e. have a low upper limit of frequency for proper transmission. Hence to properly transmit these high-frequency signals, the medium should be able to deal with the complex interaction of ‘reactance’ of the medium and also have less external interference, low attenuation and high bandwidth. For this purpose coaxial cables have been invented and deployed for the transmission of these AC or high frequency signals or currents.

**Coaxial Cables: 50 Ohm and 75 Ohm.**

A coaxial cable is comprised of three main components. In the center of the coaxial cable is what is known as the center conductor. It is either a solid wire or stranded wires and is typically a mixture of aluminum and copper. Surrounding the center conductor is a dielectric (blend of plastic and/or foam) which acts as a buffer to keep the center conductor isolated and straight. Covering the dielectric is the coaxial braided wire and/or foil, made of combination of copper and aluminum. This shield is then coated with a outer jacket of PVC to insulate it from the environment.

The physical characteristics of the coaxial cable, like the dielectric constant of the inner insulator and the radii of the inner and outer conductors, determines it’s resistance and impedance. Hence coaxial cables with two characteristic impedances are manufactured, i.e., 50Ω and 75Ω. The 50Ω coaxial cable is ideal for high power handling (i.e. 100 watts or more) and low attenuation characteristics. 75Ω coaxial cables efficient signal transmission (i.e., minimum loss in signal strength or low attenuation) and relatively low capacitance hence are effectively used for low power handling i.e., for practically all types of digital audio, digital video and data signals.

A good thumb rule is that any device that functions as a transmitter or transceiver tends to use 50Ω coaxial cable and for a device that functions as a receiver, 75Ω coaxial cable is ideal.

**50Ω Coaxial Cables.**

- ** RG58** 50Ω coaxial cables provide an affordable link for low-power RF applications over short runs. Common uses for RG58 coax include Thin Ethernet, mobile and base antenna installations, amateur radio, and communications patch bays. Pre-terminated RG58 cables feature Amphenol brand impedance-matched bnc or sma connectors.

- **RG142** 50Ω coaxial cables offer superior power handling, phase and temperature stability. Ideal for avionics, racks, cabinets, signal combiners, and internal wiring applications up to 8 GHz. VW-1 rated design is ideal for in-building WiFi, GSM, and GPRS antenna systems. Pre-terminated RG142 cables feature Amphenol brand impedance-matched BNC connectors.

- **RG174** 50Ω coaxial cables are 1/8th of an inch, allowing it to be used in real tight spaces and hence ideal for short, low-power signal runs between exciters, amplifiers, and antennas for GSM, GPRS, Bluetooth, WiFi, GPS and ZigBee applications. Pre-terminated RG174 cables feature Amphenol brand impedance-matched BNC or SMA connectors.

- **RG-213** 50Ω coaxial cables have the highest power handling capacity (1000 watts or greater), and are hence thick coaxial cables (almost half an inch).

**75Ω Coaxial Cables.**

- **RG59/U** 75Ω coaxial cable is ideal for analog and digital video distribution in professional applications where improved routing flexibility and maximum phase stability are required. RG59 is therefore preferred for patch bay, camera and remote link installations. Our RG59 coax assemblies feature matched BNC connectors by Amphenol, the inventor of the BNC interface.

- **RG59B/U** 75Ω coaxial cable is ideal for analog and digital video distribution in professional applications where low attenuation, high power handling, and maximum amplitude stability are required. RG59B is therefore preferred for long high-bandwidth links such as SDI (Serial Digital Interface). Our RG59B coax assemblies feature matched BNC connectors by Amphenol, the inventor of the BNC interface.

The Impedance of the various devices being connected, the coaxial cable and the bnc connectors itself must match properly. For instance, while connecting a 75Ω video camera connection to a studio monitor, the coaxial cable and the bnc connectors on the coaxial cable must also be 75Ω in impedance. Every single time there is a mismatch in impedance, say between a 50Ω coaxial cable and a 75Ω coaxial cable (i.e. BNC), a standing wave develops. A standing wave is a signal reflection that is essentially wasted. Every time a 50Ω and 75Ω impedance mismatch occurs, about 5% of the signal is lost. These losses add up and can eventually degrade the signal to the point that it is unrecoverable or distorted.