Designing an Inbuilding DAS

Wireless Distribution Networks

Active vs. Passive Systems: Passive distribution systems using coaxial cable are generally the first choice of engineers designing in building wireless coverage systems. Coaxial systems can be installed without highly specialized capabilities and has close to perfect reliability. Active systems using fiber optic cable, are only preferred when distances become long or when cable space is limited, but they have the disadvantage that the active components require more space in the equipment room, they need maintenance and fibers are delicate. Breaks in fiber are tough to locate and expensive to repair. So fibers have to be well protected, not an easy task in the hidden passages of a multi-user building.

Loss and Bandwidth: To make the most of the benefits of coaxial systems, it is very important to minimize loss at every stage and have a bandwidth to cover both present and future needs. Microlab air-line splitters and couplers meet these needs well, with losses below 0.1 dB, and an 800 - 2,200 MHz bandwidth to cover cellular/GSM, PCS/GSM and the new wideband CDMA.

Optimizing Network Design: Since both send and receive wireless signals are fed throughout the building on the same cable, the system must be designed for the optimum send and receive levels at every antenna location. This requires careful optimization using both equal and unequal signal splitters so that the path loss is the same between base station and each antenna, assuming all antennas are identical. An example in-building distribution network pattern is shown in Figure 1. Notice the use of air-line directional couplers as unequal dividers.

Indoor distributed antenna systems often need to carry signals from two (or more) independent service providers. In this case, a hybrid coupler can be used to combine the outputs from two indoor micro base stations. For details, see Microlab application note on 3dB Hybrid Combiners (06/10)

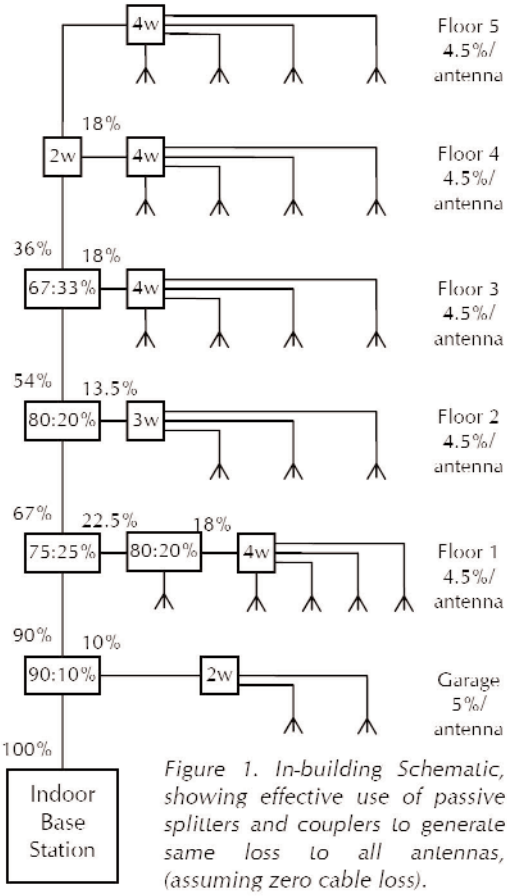

Figure 1. In-building Schematic, showing effective use of passive splitters and couplers to generate same loss to all antennas, (assuming zero cable loss).

DESIGN ALTERNATIVES

Selection of connectors: N connectors are the most common choice for indoor wireless distribution systems; 7-16 mm DIN is preferred for the larger diameter cables used for long indoor runs and outdoor systems.

Unequal Splitters/Tappers vs. Directional Couplers Unequal splitters and directional couplers can both be used to divide/combine wireless signals. In practice, the smaller more conveniently sized directional coupler is usually selected, although the unequal splitters, with multiple coupling sections, offer a flatter response at a lower price and a DC connection to the branch line. The best choice, however, is usually the tapper which has flat response, is indestructible and IP67 sealed and has a modest price. The negative is that it has minimal isolation.

Need for minimized passive intermodulation, PIM: At higher power levels, a low PIM is essential for all components, especially if the same path is shared by both transmit and receive. Low PIM is achieved through careful selection of metal and insulator materials and shapes, surface finishes, plating, and carefully controlled manufacturing processes.

MICROLAB AIR-LINE ADVANTAGES

Microlab has splitters developed for wireless.

Microlab offers superior specifications when compared with most other suppliers, especially lower loss, wider bandwidths and superior PIM performance. Other features include simple mounting, and suitability for outside environments.

Product Adaptability

Microlab is a flexible company, more capable of meeting rapid design changes to meet changing needs. For example, special couplers or splitters may be supplied on request.

The Passive Specialist

Microlab specializes in passive components. Unlike many of our competitors, our components are not merely accessories to our main line of business.

Call or e-mail us your specific hybrid requirements.

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