TESSCO

Solution: Network Optimization

Application: RF & Site Analysis—Base Station Test

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SUMMARY

An RF site, where the radio is located, can be referred to as a cell site or a SCADA radio site, but is most often called a base station. Base station equipment must be tested and maintained to ensure optimum performance of the network. Affected equipment includes the transmitter and receiver, the filtering and amplification equipment, and any signal splitters or couplers used to bring signals to and from the ports. The base station test analyzes the radio signal itself. Poor signal quality can cause poor voice quality, dropped calls, and low throughput speeds, leading to customer complaints and lost revenue.

FEATURES

- Installation verification
- Interference analysis
- Capacity analysis
- Quality of service (QoS)
- Frequency and power measurements
- Received sensitivity measurements
- Impedance mismatch
- Insertion loss
- Preventative maintenance
- Equipment maintenance
- Component analysis

BENEFITS

- Quickly isolates and identifies interference sources
- Improves systems performance with optimal signal output
- Stores baseline traces to compare new to current
- Assures high-quality system knowledge

REAL WORLD EXAMPLES

Situation: A carrier received a high number of blocked calls from an entire cell site although the network indicated all radios were functioning properly and there were no high VSWR alarms.

Problem: A local used car dealer was using a broadband noise generator to block sales of his neighboring auction house that served mostly online traders.

Solution: The carrier analyzed the noise floor of the surrounding airwaves using a spectrum analyzer and found that the problem was outside the base station. Using a directional antenna, they quickly triangulated and located the source. Once confirmed, the FCC was notified and the problem was resolved. Situation: A contractor who was deploying 3G UMTS conversions verified all of the connectors and performed a sweep test. However, the system test showed errors in all channels and what little audio or data that did come through was distorted.

Problem: With the WCDMA-type systems, synchronization is critical to allow the timing and phasing to break one frequency into multiple voice or data channels.

Solution: The technician used a spectrum analyzer and a power meter to verify the signal levels and frequencies. Then he demodulated the signal to view separate channels; the phasing and timing were fluctuating, preventing clear channels for communication. The system synchronization needed a new source, resolving the problem.

Situation: A state highway administration's two-way communications were working fine until they added a new talk group for the bridge authority. The handhelds and portables could talk to each other, but the base station could not recognize any talk group once they were programmed.

Problem: A poorly grounded base radio had finally broken continuity and the noise floor raised just enough to mask the sub-audible tones for the talk groups.

Solution: A closer look at the demodulated signal displayed that no tones were being decoded. Then a closer look with the spectrum analyzer revealed the noise problem, which is now solved.

ADDITIONAL CONSIDERATIONS

- What types of systems do you need to test?
- What modulation or coding does your system use?
- What is the highest and lowest frequency of use?
- What is the maximum power to be measured?
- Exactly what tests do you need to measure?
- What connection types do you need to interface?

PRODUCTS

- Base station test or service monitor
- Spectrum analyzers
- Attenuators and adapters
- Signal sources
- Transit cases
- Power sensors