Anritsu envision : ensure

Case Study

Remotely Monitoring Mission Critical Positive Train Control Networks

Anritsu Selected to Meet the Interference Study Technical Challenge

Overview

Positive Train Control (PTC) is an advanced communications system to minimize train accidents by automatically controlling train activity. This includes real-time monitoring of static and dynamic conditions that require the train to slow or stop. The On Board Computer (OBC) monitors these conditions, and in the event of an improper response from the engineer, the OBC takes control and slows or stops the train within a safe braking distance from the restriction. The topology of a PTC controls system is shown in Figure 1 below.

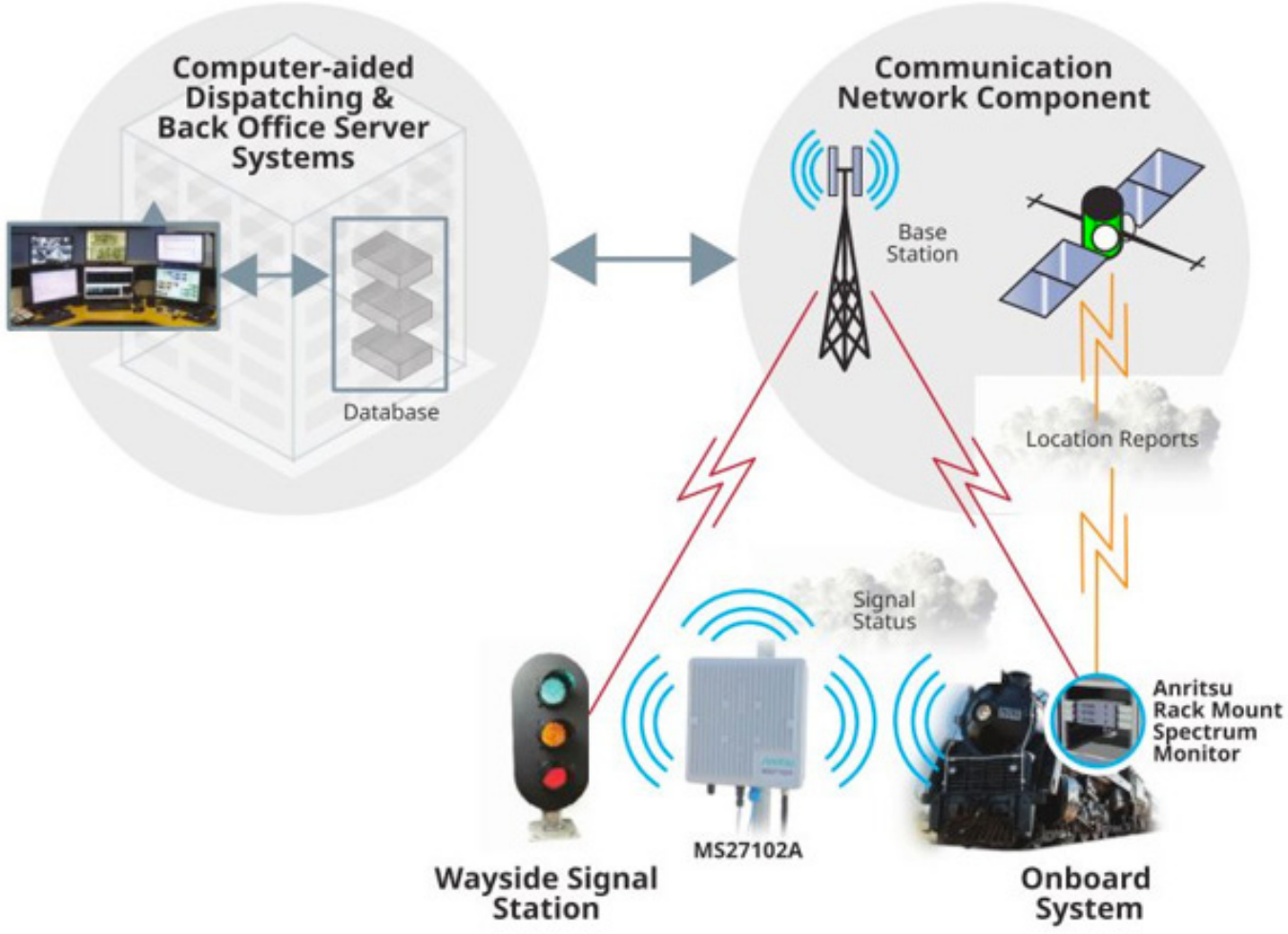

Figure 1. Positive Train Control (PTC) Topology

Challenge

Clifton Weiss & Associates, Inc. (CWA) was retained as professional consulting engineers to conduct a 3-year study of interfering RF signals on an actively operating Northeast commuter railway. Signals-of-interest were defined by the IEMTS (Class 1) RRs, ACSES-II used on the Northeast Corridor (NEC) from Boston to Washington and FRA passenger Positive Train Control (PTC) 217-222 MHz spectrum. Prioritization was assigned to identify periodic or persistent interferers that potentially risk the performance within pre-assigned PTC public safety system locations. The customer deadline to provide the first detailed monthly report was less than 4 months from being awarded the contract. The complete solution was architected, integrated, installed and commissioned within the allocated timeframe. A 3-instrument remote spectrum monitoring system with LTE connectivity was needed to capture signals across a wide dynamic range, while supporting a fast measurement speed with user definable RBW/VBW and integrated capture. Also required was database software capable of data logging, analysis and the ability to create customized reports.

Solution

Anritsu's MS27101A, 9 kHz - 6 GHz, ½ rack mount Remote Spectrum Monitor™ web-based automated data capturing hardware and Vision™ database software platform were selected as the unique, single supplier solution capable of meeting the interference study technical challenges. 12V DC power, rack locations, omni-directional antennas, coax cabling and a 4G LTE modem were specified to support the hardware test plan. Anritsu Vision spectrum application software provided complete command and control of all three MS27101A spectrum monitoring receivers. Given the potentially short duration of signals within the PTC band, the Vision Software engine was configured to create both a near real time and continuous spectrum view while minimizing backhaul data usage. Each MS27101A utilizes the cellular 4G network via an LTE modem. A customized database in Vision presents spectrum reporting information correlated to GPS coordinates from each MS27101A. This information is regularly monitored by CWA engineers with monthly reports provided to the end customer. The challenge is to quickly measure 12.5 kHz channels within a 5 MHz wide frequency band. Power measurements were conducted in signal and guard bands to both measure signal activity and insure spillover was minimized. After collecting data 24/7, periodic spectrum occupancy reports were generated using Vision's monitoring system. Periodic occupancy reports were generated using Vision's monitoring system. Figure 2 depicts the measurement dashboard as well as the spectrum occupancy analytics.

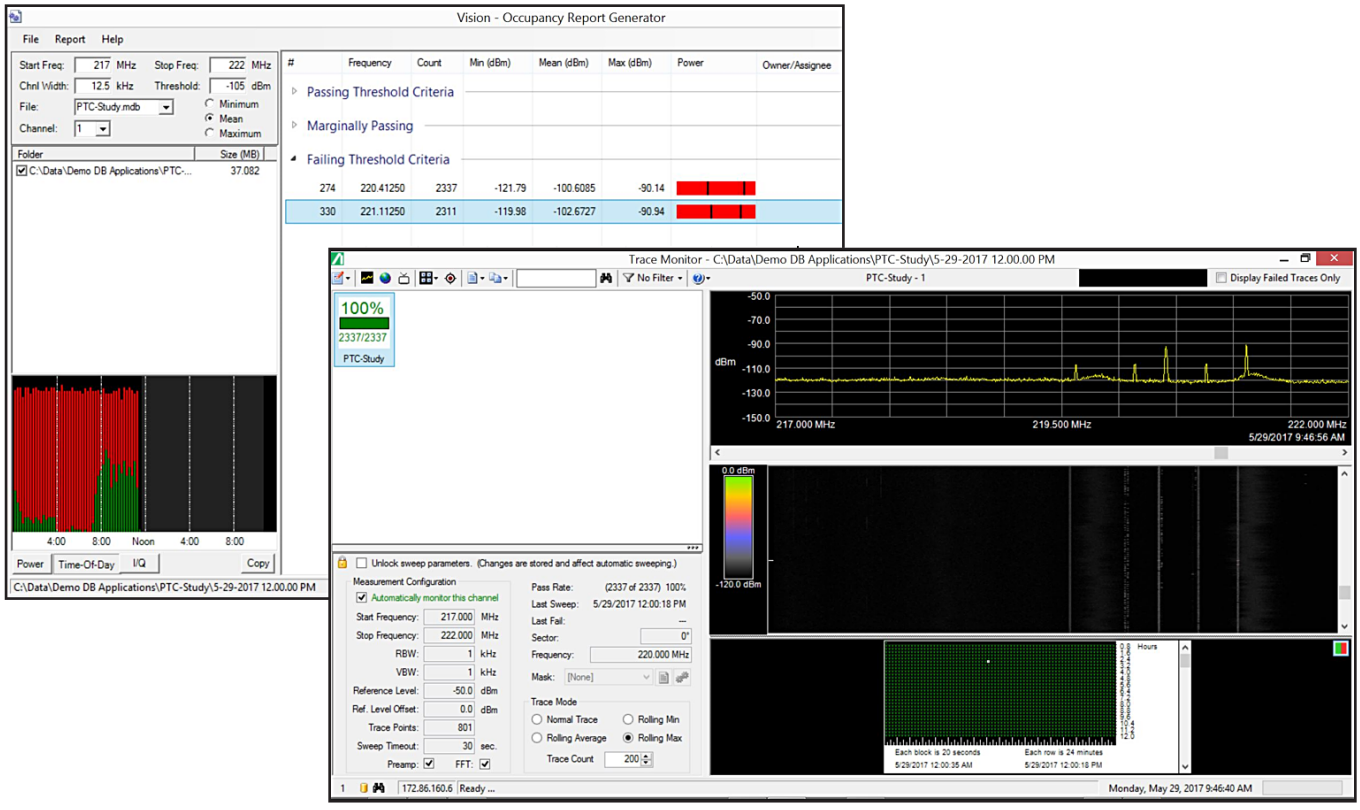

Figure 2. Measurement dashboard and spectrum occupancy analytics

As RF spectrum densifies, the need to monitor and manage Spectral usage increases. The Anritsu MS2710xA series Remote Spectrum Monitors and associated Software Suites are designed to monitor, analyze and archive spectral activity, which are key to maximizing available spectrum resources and minimizing interfering events.

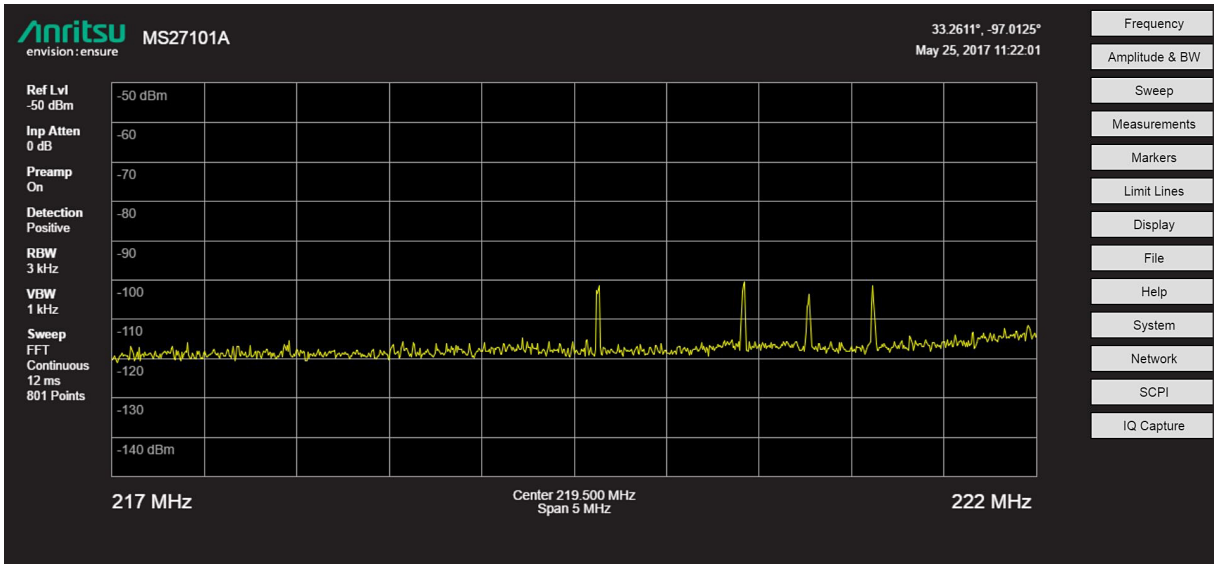

Figure 3. Fast Sweep/Low Noise Floor

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