



Personal Communications System Analyzer

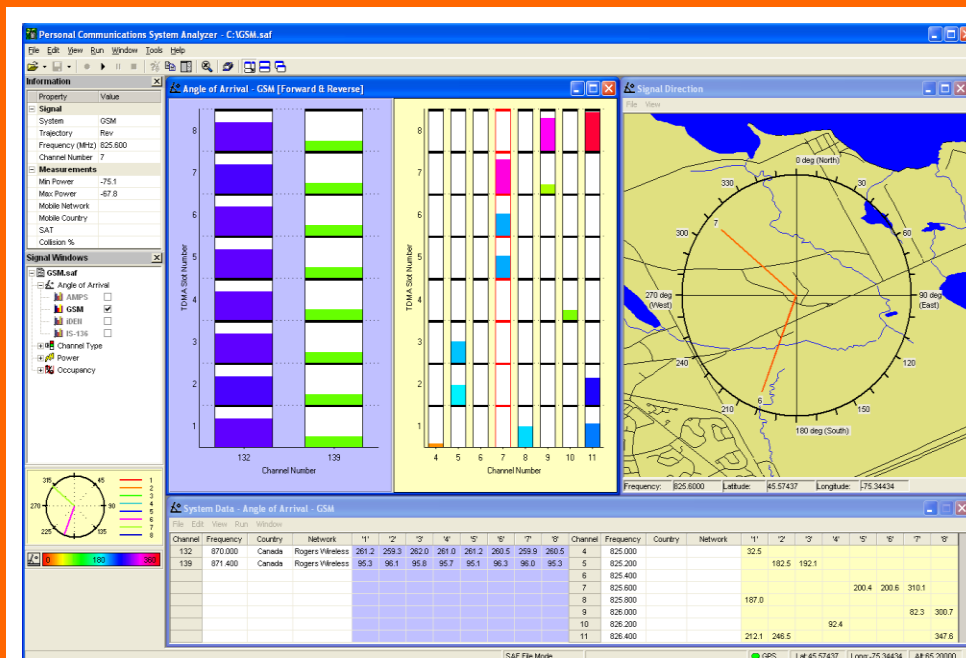
The CRC-developed Spectrum Explorer (SE) is a flexible software solution which provides a family of sophisticated applications that perform spectrum surveillance and analysis.

Installed on a Windows-based PC, SE works with a broad range of commercial RF receiving and digitizing hardware. SE supports the digital signal processing and user-friendly GUI control needed by specialists to assess the usage and quality of the radio spectrum.

SE core applications:

- Wideband Scanner (WBS)
- Spectrum Analyzer (SA)

The **Personal Communications System Analyzer (PCSA)** is an optional SE application that provides online monitoring, characterization and analysis of TDMA signals (including GSM) used for mobile communications. Robust signal processing techniques allow for the extraction of parameters related to spectral and traffic occupancy, channel type identification, angle of arrival of mobile users and decoding of network information.



Major Features

- Analyze personal communications systems:
 - GSM / GPRS, US Digital Cellular / IS-136, iDEN, AMPS
- Angle-of-arrival of TDMA users
- Channel type identification, including:
 - Traffic channels, Control channels, Dummy channels, Noise
- Channel and traffic occupancy of TDMA systems
- Demodulation of GSM network information, including:
 - Network operator's name and country
 - Network operator's list of channels
- Spectral Occupancy Parameter Extraction
 - Power and SNR of TDMA slots
 - Adjacent channel interference power, SIR
- Can operate from a digital spectrum analyzer
- Complementary interworking with other SE applications
 - WBS, DF, SA

Specifications

Spectrum Explorer's modular design supports numerous configurations of tuner/ADC subsystems and can run on several generations of Windows-based PCs. Your system's performance will depend on your chosen hardware and number of concurrently running applications.

Characterizations of Mobile TDMA systems

Mobile Communications Systems	GSM/GPRS, USDC/IS-136, iDEN, AMPS
Frequency Range	Cellular and PCS frequencies (antenna dependent)
Noise Tolerance	Reliable parameter estimation (> 90%) at SNR = 8 dB
Interference Tolerance	Insensitive to strong adjacent channel interference
Processing Speed (max) ¹	GSM = 500 channels/s, IS-136 = 80 channels/s, iDEN = 45 channels/s, AMPS = 160 channels/s
Precise Timing Capability	Provided by GPS module

Results Displayed

- Angle-of-arrival (AOA) of TDMA slots
- Channel type (traffic, control, dummy, noise)
- Network operator's name and country (GSM)
- Occupancy (channel or traffic) of TDMA slots
- Power of TDMA slots (dBm)
- Network operator's channel list (GSM)

Technical Parameters

- SNR in system bandwidth
- SIR (adjacent channel)
- SAT frequency (AMPS base station identification)
- SNR in observed frequency band
- Adjacent channel interference power

Operational Interface

- Log results online to ASCII file
- Playback results offline from ASCII file

Operations

The PCSA is an effective tool for the online characterization of the various personal TDMA systems sharing the cellular and PCS frequency bands. Robust and efficient signal processing techniques extract many of the parameters used by radio inspectors. The PCSA allows you to monitor a network's true traffic occupancy and measure its effective use of the radio spectrum. For GSM, results can be traced to a network operator by decoding the broadcasted network information. With SE's Direction Finder option, bearings of all active mobile users are computed in parallel for an instantaneous depiction of the band of interest. All results can be logged to an ASCII file and played back for future analysis.

¹ Sampling at 5.12 MHz, 100 MB/s data bus, 2.8 GHz processor.



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