TCI
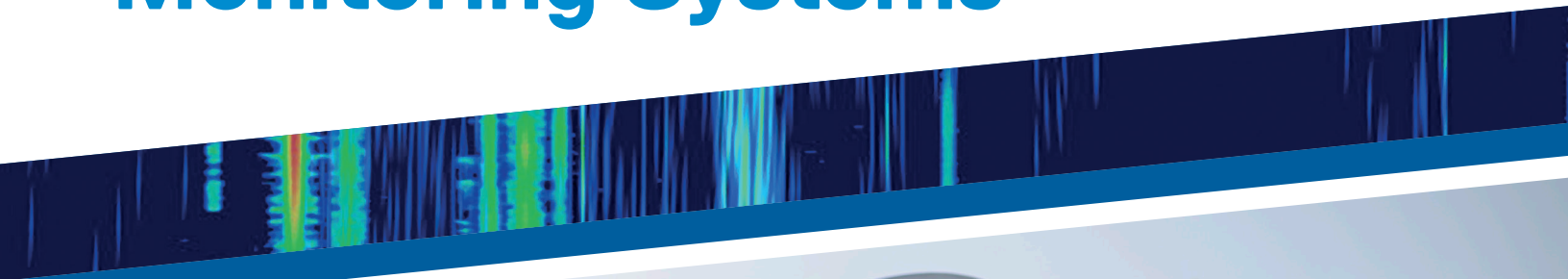MASTER THE SPECTRUM

TCI Compact Spectrum Monitoring Systems

COMMTECH

Continuous advances in RF technology create ever-evolving challenges for monitoring and managing the radio spectrum. TCI's Compact Spectrum Monitoring Systems (CSMS) are the next-generation solution for detecting and locating modern signals of interest for spectrum allocation and optimization, interference mitigation, public safety, and national security missions.

TCI's CSMS leverage a 50-year legacy of designing, deploying, and maintaining spectrum monitoring solutions. TCI CSMS utilize leading-edge technology to achieve the highest performance, reliability, and ease of operation to meet today's monitoring challenges.

The ITU-compliant CSMS are built upon TCI's field-proven 700 series and provide lower size, weight, and power (SWaP), which enables flexible mobile deployments and fixed installations.

Built-in networking capabilities are the foundation for modular and scalable monitoring networks, controlled from one or more operational centers. The CSMS exhibit high system sensitivity and overall performance and requires fewer deployed systems for monitoring and geolocation tasks. TCI CSMS are backwards compatible with other 700 series systems and require no field calibration.

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TCI's Scorpio™ spectrum monitoring software is easy to use and provides extensive built-in self-tests (BIST) to reduce maintenance and training requirements. All features combine to minimize costs for initial procurement and installation, as well as recurring costs for site leases, and data links to provide the lowest total cost of ownership.

OPTIMIZED FOR A WIDE RANGE OF APPLICATIONS

› ITU-compliant spectrum monitoring
› and management
› Interference detection and geolocation
› Asset and event protection

BEST VALUE SOLUTIONS

› Highest level of performance
› Greatest ease of operation
› Lowest total cost of ownership

Detecting and Locating Interference

Fast and accurate signal measurements are essential for critical, safety-related applications, whether interference comes from other radio services, defective equipment, or unauthorized usage. With TCI's CSMS, an operator can schedule automated monitoring, define multiple bandwidths to scan, and select scan durations (continuous or periodic), which makes it possible to detect and locate non-persistent interference sources. Scorpio™ spectrum monitoring software supports the fast differentiation needed to separate valid signals from interfering transmissions.

These capabilities make CSMS suitable for: Homeland Security, asset protection, public event safety applications, detecting interference on aviation frequencies and ITU-recommended measurements for license verification.

Monitoring Defined Frequency Ranges

Using TCI Scorpio™ software, the CSMS can provide spectrum occupancy measurements to assist in monitoring spectrum usage, locating interference, identifying traffic analysis patterns, and performing band-clearing activities. These measurements are performed in accordance with the 2011 ITU Spectrum Monitoring Handbook and to the accuracies defined in ITU-R SM 1880.

Spectrum occupancy can be measured in several ways. The user can select a "channel scan" to look at specific channels. Or, a "spectrum scan" may be performed to continuously monitor a user-defined range of start and stop frequencies. The system performs statistical analyses of transmissions and spectrum occupancy that are then available on-screen.

Protecting Public Venues and Events

The benefits of a compact, rugged, and power-efficient spectrum monitoring solution extend to defending assets such as conference centers, sports stadiums and outdoor-event grounds.

The TCI CSMS provide exceptional flexibility in positioning networked systems in locations that provide optimum coverage and geolocation capability. Signals of interest that represent potential security threats can be quickly detected and security personnel directed to their vicinity to investigate.

TCI systems help protect high-value areas such as government facilities and embassies as well as airports, harbors and public venues
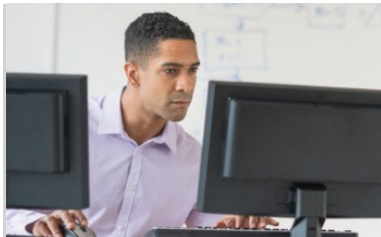
The TCI Advantage: Complete spectrum solutions provide vital data for government and military agencies in over 100 countries

Securing High-Value Facilities

TCI's CSMS can also detect unfamiliar patterns of radio transmissions and search for, locate, and report the signal characteristics of suspicious transmitters associated with a specific facility. It can provide actionable intelligence for risk mitigation and enable security efforts to focus on specific areas of buildings as needed.

By creating geographic and spectrum masks, signals of interest can be monitored autonomously and automatically trigger alarms.

## TCI: A Global Provider of Spectrum Solutions

TCI has 50 years' experience meeting the challenges of regulatory and law enforcement agencies tasked with managing the radio spectrum. We have four decades of geolocation technology development and implementation in fixed and mobile configurations. Regulatory authorities in more than 50 countries rely on TCI's monitoring solutions to manage their spectrum.

TCI employs innovative receiver, antenna, and software design; rigorous quality management; modern manufacturing facilities and processes; and global installation, training, and support services to ensure our customers' success.

## Full Compliance with ITU Recommendations

TCI systems are fully compliant with ITU-R recommendations as outlined in the 2011 International Telecommunications Union Spectrum Monitoring Handbook. They meet or exceed all recommendations for measurements, including:

> Frequency

> Field Strength

> Occupied Bandwidth

> Modulation

> Direction Finding

> Spectrum Occupancy

> Automatic Violation Detection
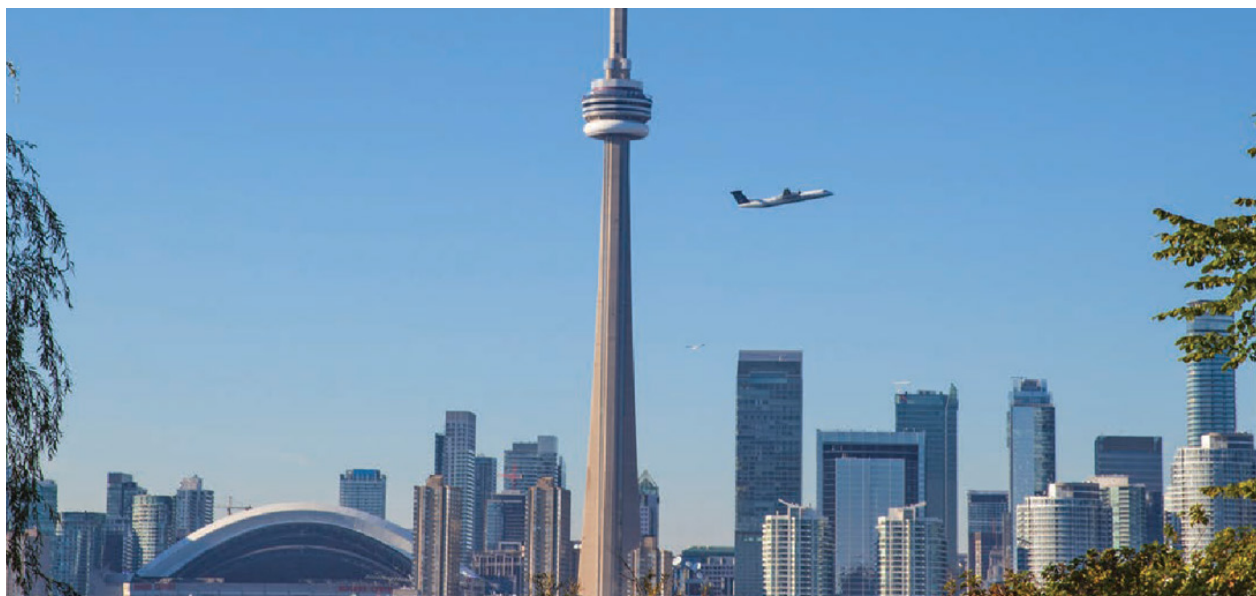
Spectrum Coverage Analysis

The high system sensitivity of TCI CSMS translates into more geographic coverage per monitoring station than lower sensitivity systems. The spectrum coverage map below illustrates the effective coverage of nine TCI CSMS stations versus the coverage provided by nine competitor's receivers. This analysis illustrates that TCI requires approximately one-half the number of sensors as the competitive alternative to achieve the same coverage.
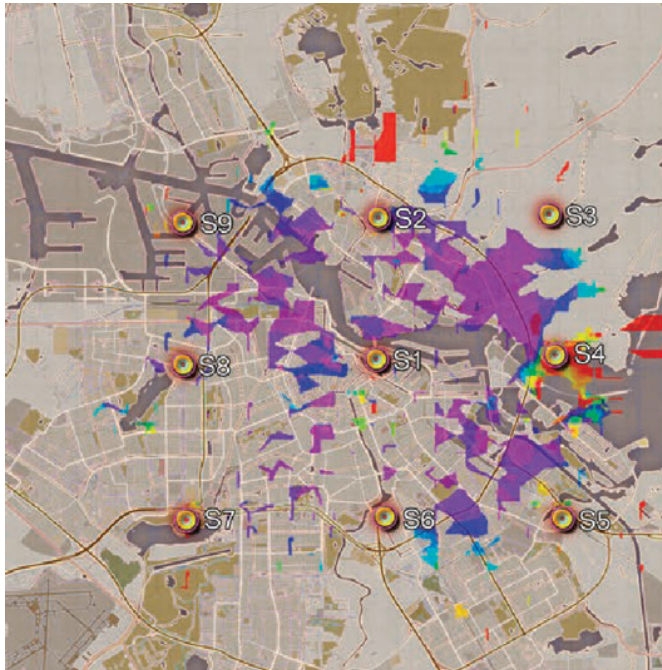
Competitor Receiver, Nine Sensor Deployment
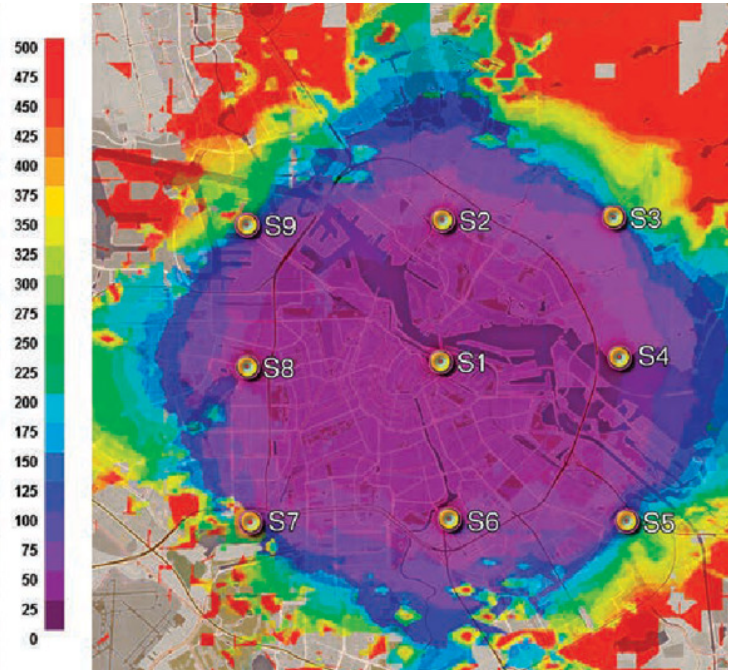
TCI Receiver, Nine Sensor Deployment

< Miss Distance in Meters

> Competitor's Receiver – Nine Sensor Deployment* (Above left) Areas of geolocation accuracy are limited and discontinuous within the same sensor perimeter.

> TCI Receiver – Nine Sensor Deployment* (Above right) Continuous coverage with high geolocation accuracy was achieved throughout the area defined by the sensor perimeter.
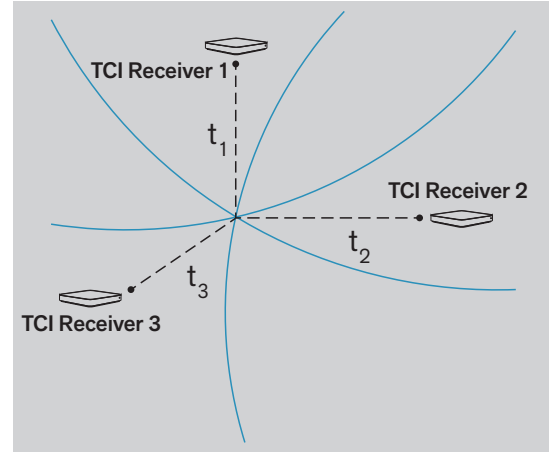
*Simulation Parameters:
 900 MHz, 1W TX power, 3m sensor height

TCI Technology Provides:

> Higher Probability of Detection

> Increased Geolocation Accuracy

> Highly Efficient Deployment Footprint

> Lower Total Cost of Ownership

TCI CSMS solutions bring advanced functionality to a variety of radio monitoring applications in which outstanding price, performance, space-saving integration, and low-density deployments are essential

Emitter geolocation as determined by the intersection of TDOA isochrone results

TCI TDOA Geolocation

Time difference of arrival (TDOA) technology is an advanced method of determining a transmitter location by comparing the difference in time it takes a signal to arrive at each of a network of receivers. A pair of stations receiving the signal provides a hyperbolic map plot of possible emitter locations based on the difference in time the signal arrives at each station. Each additional station pair receiving the signal provides another intersecting hyperbola, which further refines the emitter location. Transmitter position is determined by correlating data from at least three synchronized receivers.

TCI's CSMS are designed specifically for TDOA operations and achieve nanosecond timestamp accuracy using an integrated GPS receiver to enable high precision measurements required to locate signals of interest in crowded signal environments. TCI's flexible CSMS technology is easily integrated into existing TDOA and hybrid TDOA/AOA monitoring networks.

Scalable Systems That Meet the Challenges of Today and Tomorrow

TCI CSMS systems can be deployed as a standalone network for spectrum monitoring and asset protection tasks and integrated into existing networks for expanded coverage.
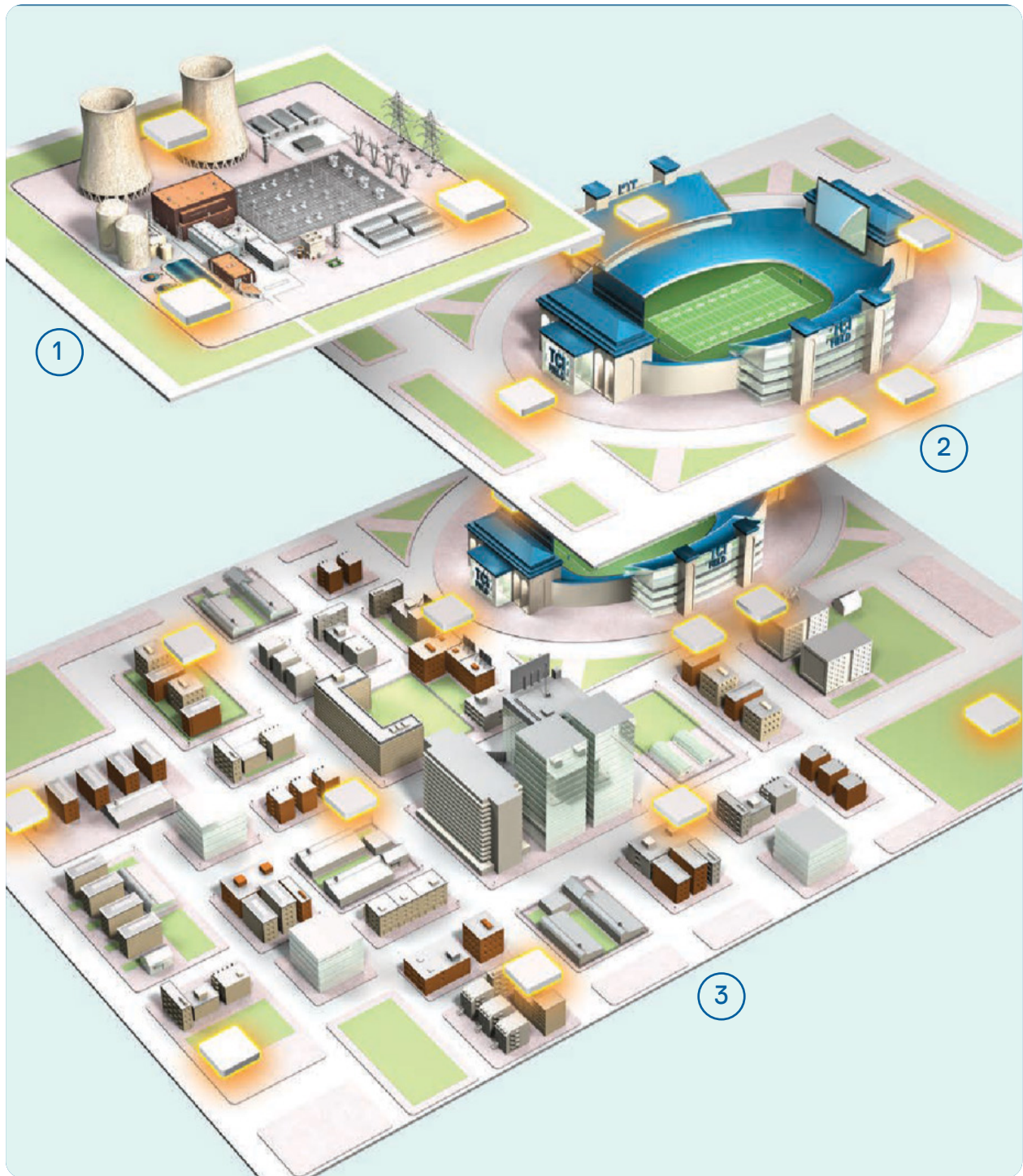
1. A three-station CSMS network for small area & facility monitoring.

2. Multi-station CSMS network for monitoring larger areas and public events.

3. TCI's flexible CSMS technology is easily integrated into existing TDOA and hybrid TDOA/AOA monitoring networks.

Enabling Partners to Command the Spectrum

Communications Technology ("CommTech") is a global supplier of turnkey solutions for Communications Intelligence, (COMINT), ITU-compliant spectrum monitoring and management, direction finding and geolocation, and antennas for communications and high-power radio broadcasting. Under the TCI brand, CommTech systems and solutions have been delivered to national defense departments, intelligence agencies, law enforcement bureaus, and spectrum regulators in more than 100 countries.

CommTech empowers our partners to "Command the Spectrum" within civilian, law enforcement, intelligence, and defense environments. Under the TCI brand, CommTech provides field-proven, mission-ready, and easy-to-use spectrum management and monitoring solutions to meet our customers' complex requirements. Our solutions incorporate the very latest technologies available in digital direction-finding and signal analysis.

CommTech's 85-years' combined experience providing RF solutions and support services ensures mission success in more than 100 countries. We are continually evolving these solutions with leading-edge technologies to address the needs of tomorrow and beyond.

TCI and ECS are wholly owned subsidiaries of SPX Technologies (NYSE:SPXC), a publicly traded firm based in Charlotte, North Carolina. SPX Technologies is a global, multi-industry manufacturing leader committed to operational excellence and execution. Learn more about TCI at www.tcibr.com and SPX Technologies at www.spx.com.

COMMTECH
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CSMS-03-27-23