

Leveraging Geospatial Technology for Improved Telecommunication Network Planning, Provisioning and Monitoring

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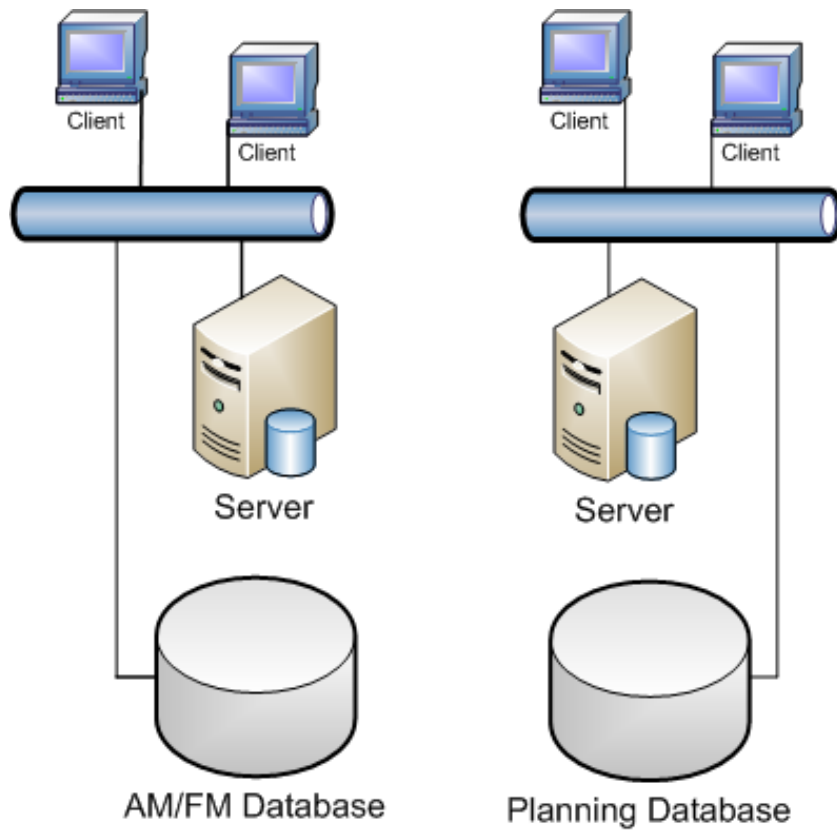
Overview

- Cloud-Based Architecture for Telecom and Geospatial Data
- Benefits
- Challenges
- Sample Applications and Case Studies

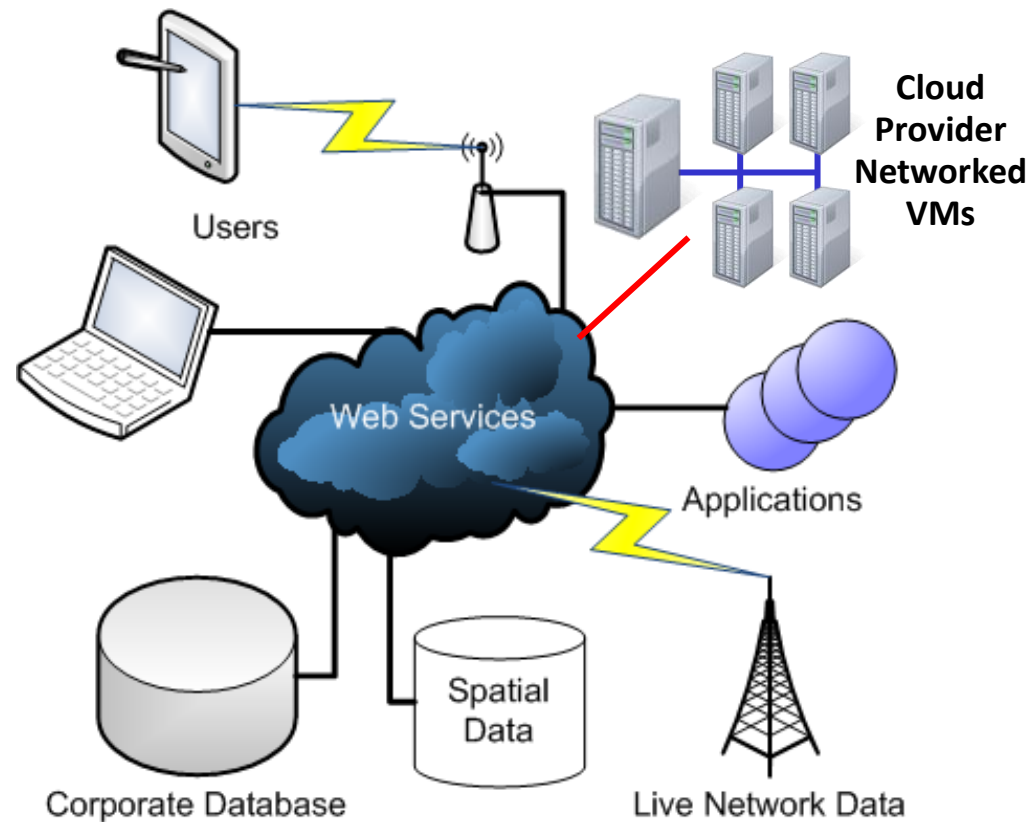
The Emergence of Web Services

Breaking with the Past

Traditional Client-Server Model



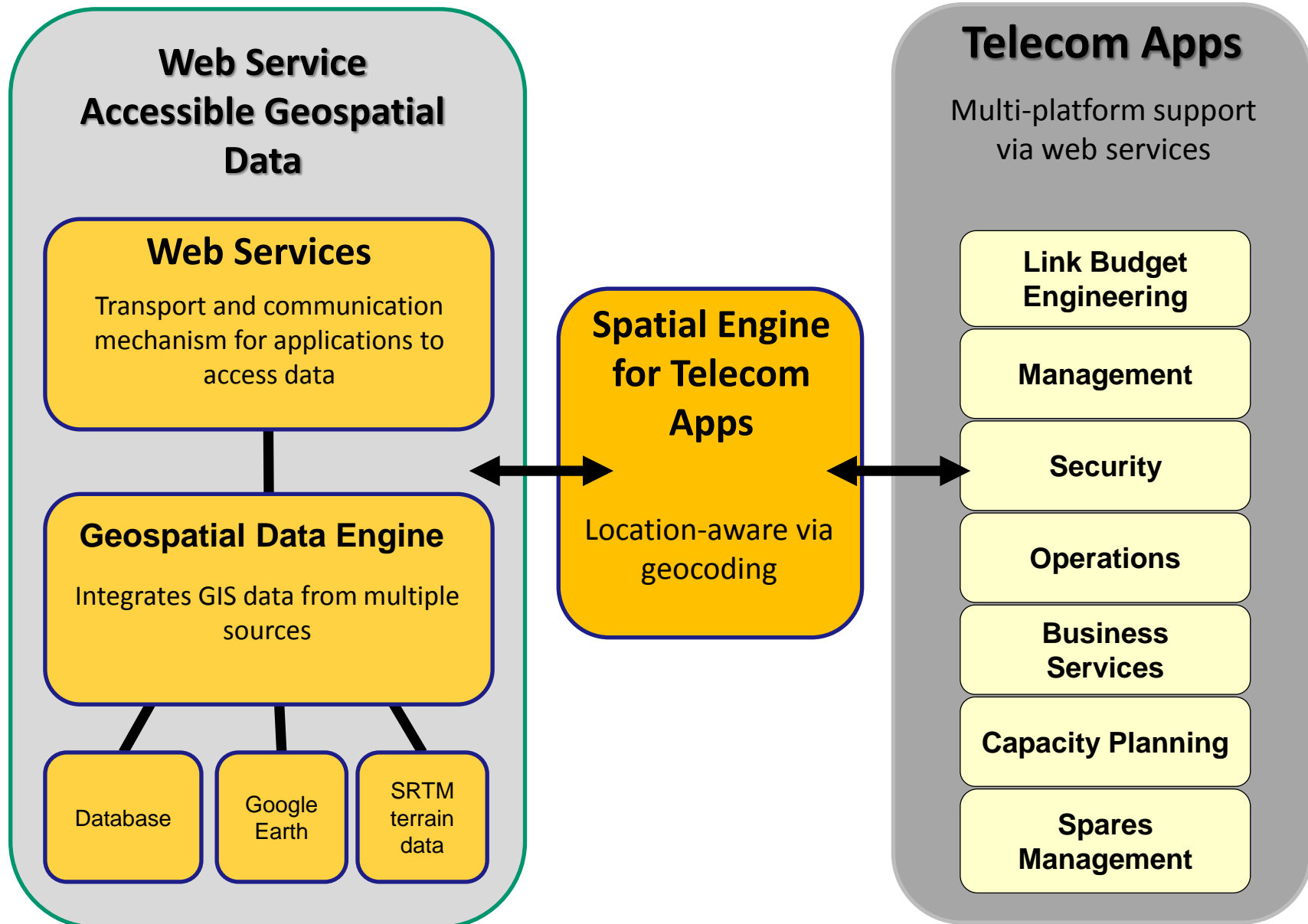
Cloud-based Architecture



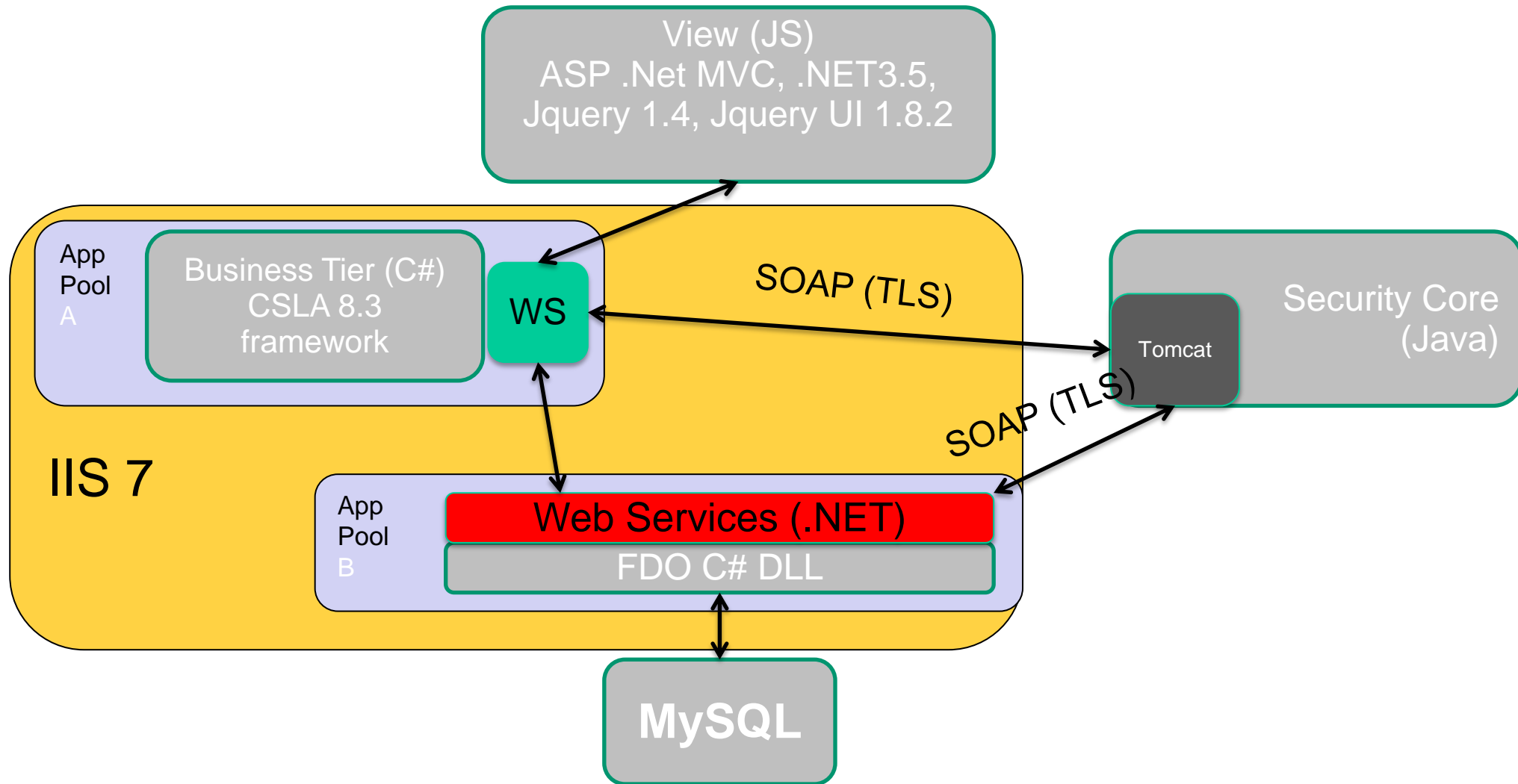
Enabling Technology

- Spatial data is free or low cost, and accurate enough
- Rapid application development with open systems tools
 - Web services–based toolkits now freely available (e.g., Google, MapGuide Open Source, Map Server)
- Simplicity of web services facilitates integration between applications, including new geospatial data sources
 - Network planning to provisioning
 - Network management to root-cause analysis
- Mobile users can readily update corporate data
 - Increased compute power and location-aware smart mobile device

Telecom Geospatial Data Framework



Web Services Architecture for Telecom Geospatial Framework



What are Common Practices Today

The screenshot displays the 'Map Console' application window. The title bar reads 'Map Console'. The menu bar includes 'File', 'Edit', 'View', 'Manager', 'Layout', 'Map', 'Configure', and 'Help'. The toolbar contains various navigation and tool icons, with a zoom level set to 100%. The main interface is divided into several sections:

- Manager:** A dropdown menu is set to 'INCHARGE-SA'.
- Left Panel (Tree View):** Shows a hierarchical structure under 'INCHARGE-SA':
 - Host
 - InChargeService
 - NDE_OpticalNetworkElement
 - 192.168.1.54:Nortel_OM51
 - 192.168.1.55:Nortel_OM51
 - 192.168.1.56:Nortel_OM51
 - Session

- Right Panel (Diagram):** Displays a network diagram with nodes and connections. A context menu is open over a node labeled '192.168.1.55:Nortel_OM...'. The menu items are:
- Physical Connectivity
- IPNetwork Connectivity
- VLAN Connectivity
- Business Services
- Application Relationship Map
- Notification Properties
- Browse
- Browse Detail** (highlighted)
- Schedule Maintenance

At the bottom of the window, the status bar shows 'EMC Ready' on the left and '** Not saved **' on the right. The 'Topology' and 'Groups' tabs are visible at the bottom left of the main area.

The Data Store

- Evolving from foundation of the client-server architecture to part of the cloud web service
- Still the common framework used to integrate information
 - Central store, Data mining, Versioning, History, Business Rules, GIS references
- Specialized knowledge no longer required to build and maintain the data store
- Toolkits such as Google have simplified the handling of spatial data – no need any longer to understand how it is built, stored, or managed

Technology and Business Challenges

- Is geospatial data really “free” in the open world (Google API and others)?
 - What are you giving up for access to the data?
 - Privacy – need to provide information that can be critical for the telecom provider, and need to maintain subscriber and customer confidentiality
 - No Service Level Agreement (SLA) with open-source providers
- Quality of information available in the cloud
- Securing the cloud – end-to-end
- Providing end-to-end security of transactions
 - As a method to mitigate challenges

Benefits of Spatial Enabling for Telecom

General...a few examples

- OSS applications today depend on infrastructure, but are poorly integrated at the spatial layer
- Awareness of collocation, proximity, and spatial relationships among infrastructure
- More rapid response to subscriber service requests

Network Planning

- Faster service rollout to subscribers

Network Management

- Correlation of critical events and outages
- More efficient operations – e.g., route planning for maintenance crews

Case Studies

DragonWave Horizon Link Planner

Optical Link Budget Engineering

Network Management Integrated with EMC Ionix in
a Geospatial Framework for Event, Correlation and
Analysis



Network Planning

DragonWave Horizon Link Planner

RF Planning Tool

<http://www.dragonwaveinc.com/>

- What geospatial function was required for RF planning: location, line-of-sight, distance and elevation
- Going from 4-5 “power users” to 100’s of channel and non-specialist users and integrated with the sales process and systems
- Integration of free and open Google Maps, Google API SRTM, Goes, and Autodesk MapGuide

Benefits: Rapid expansion of business sales model and acceleration of business processes

Application with Line of Sight, Integrated with Terrain Data in a Web Services Framework

Microwave Link Planner - Windows Internet Explorer

http://208.124.249.198/mapguide2010/fusion/templates/mapguide/dragonwave/index.html?APPLICATIONDEFINITION=Library://DragonWave/DragonWave.ApplicationDefinition&SESSION=b8749942-14ba-102d-8000-000c2963bcb0_en_7F00C

File Edit View Favorites Tools Help

Microwave Link Planner

Welcome tok! [[Log Off](#)]

Project Definition

Name: tok1
 Description: testing
 Created On: 3/16/2010
 Project Units: Imperial Metric

Quick Link

Sites

Name	Latitude	Longitude	Height (m)	Description	Symbol
Site A	45.382205	-75.745175	0	Test Site A	Circle
Site B	45.4200555	-75.7003528	0	Test Site B	Circle

Links

Project Defaults

Link Configuration: tok

Path Clearance: Frequency Band: 11GHz, First Fresnel Zone: 60%, K Value: 1.33, Minimum Clearance: 0m

From Site	To Site	Path Clearance Criteria	Link Configuration	Rain Rate (mm)
Site A	Site B	15GHz, 60%, 1.33, 0(m)	tok	36.82

Google Streets Google Satellite Google Hybrid Google Terrain

Select Pan Zoom Rectangle Zoom In Zoom Out Zoom Extents Zoom Selection Previous Next

Ottawa

Site A Site B

1: 72224.0027 20408.69 x 14523.04 m

Powered by Google

Internet 100%

RF Engineering Function

The screenshot displays the Microwave Link Planner application within a Windows Internet Explorer browser window. The browser address bar shows the URL: http://208.124.249.198/mapguide2010/fusion/templates/mapguide/dragonwave/index.html?APPLICATIONDEFINITION=Library://DragonWave/DragonWave.ApplicationDefinition&SESSION=b8749942-14ba-102d-8000-000c2963bcb0_en_7F00.

The application interface is divided into two main sections:

- Link Configuration Properties:** A form on the left side for configuring the link. It includes fields for Name (tok), Product Family (Horizon Duo, dual carrier), Regulation (FCC/IC), Minimum Throughput (400), Frequency Band(s) (11GHz, 18GHz, 23GHz, 28GHz), Channel Size(s) (30MHz, 40MHz), Up to defined max antenna size (checked), Site A Max Antenna Size (3ft/90cm), Site B Max Antenna Size (2.5ft/75cm), Min. Availability (No Minimum), Coupler (no radio combiner), Waveguide loss (0), and Polarization (Vertical). Buttons for Save and Cancel are located below the form.
- Map:** A Google Maps view of Ottawa, Ontario, Canada. A yellow line represents the microwave link path, starting at Site A (located near Carlington) and ending at Site B (located near the University of Ottawa). The map shows various streets, parks, and landmarks.

The status bar at the bottom of the application shows "Done", "No features selected", "1: 72224.0027", "20408.69 x 14523.04 m", and "Powered by MapGuide".

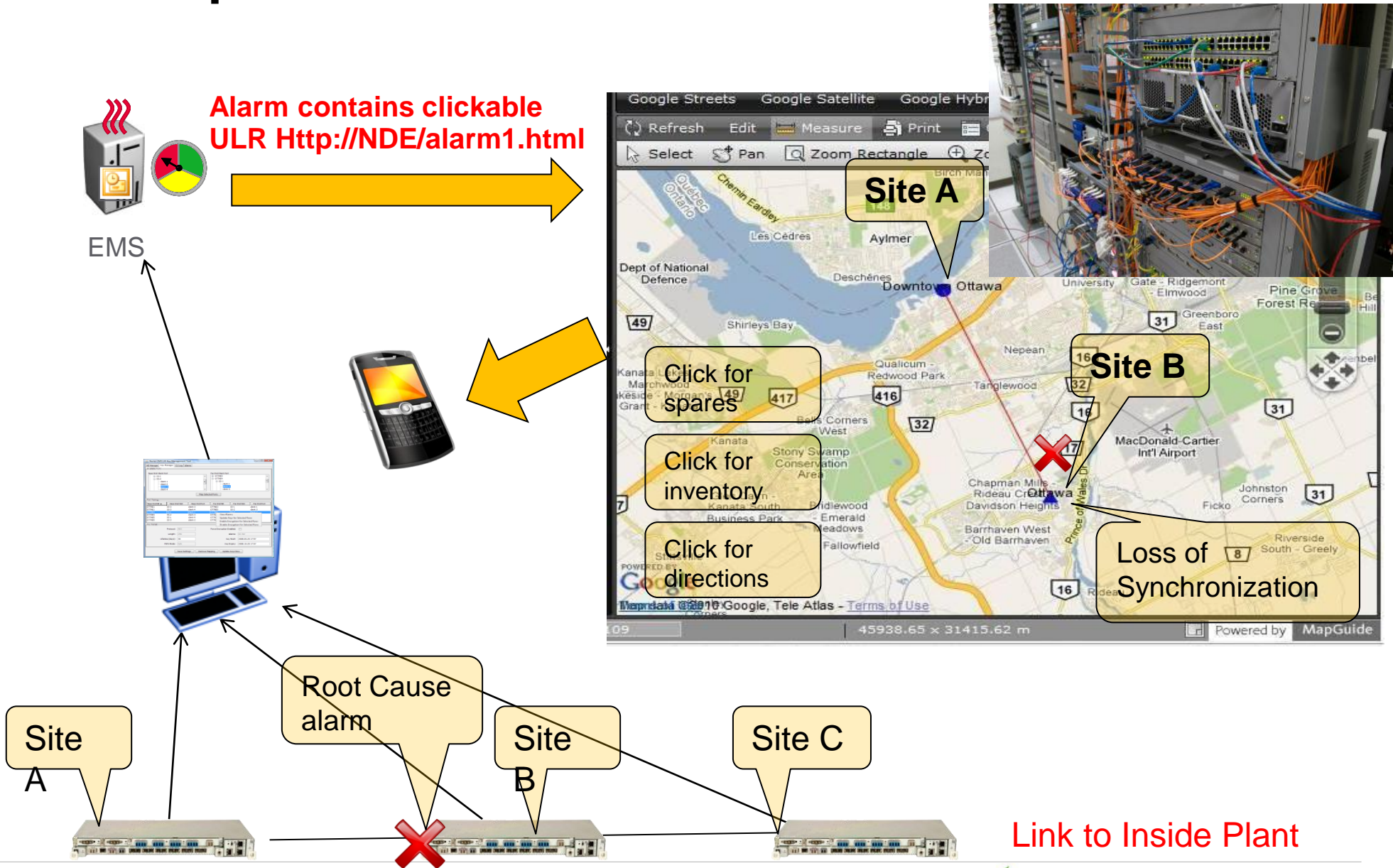
Key Values

- Cost reduction for engineering and BOM creation
- Faster network engineering
- Improved security and control with a single planning tool
- Reduced R&D costs for a licensed application

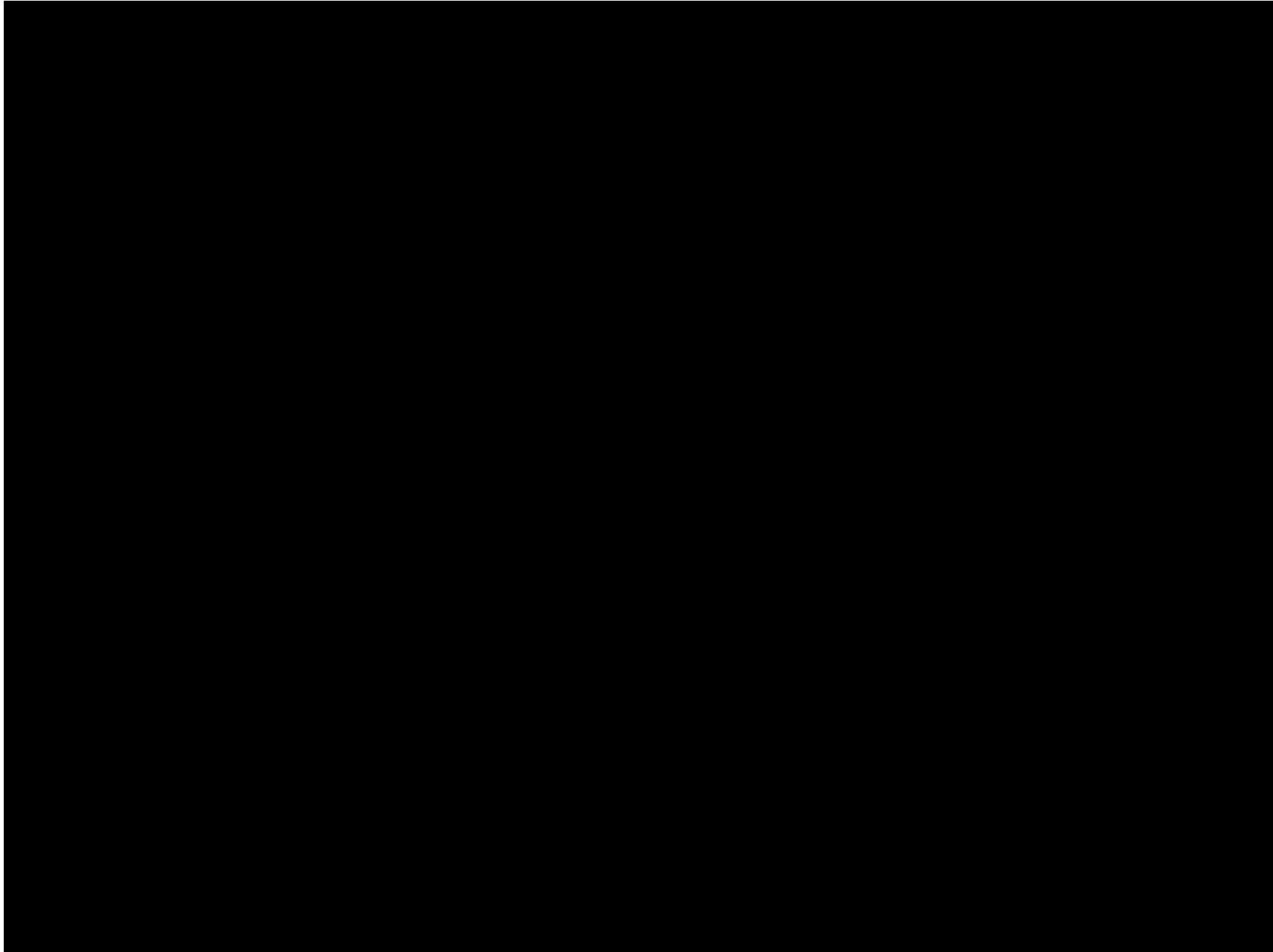
Geo-Spatial Integration Solutions

- NOC Center's receiving alarms from devices often need location information
- Dynamic map technology coupled with fault correlation can reduce the cost and time of problem resolution
- URL per incident decouples the OSS system from the display of information using web services
- Optimize spares and inventory

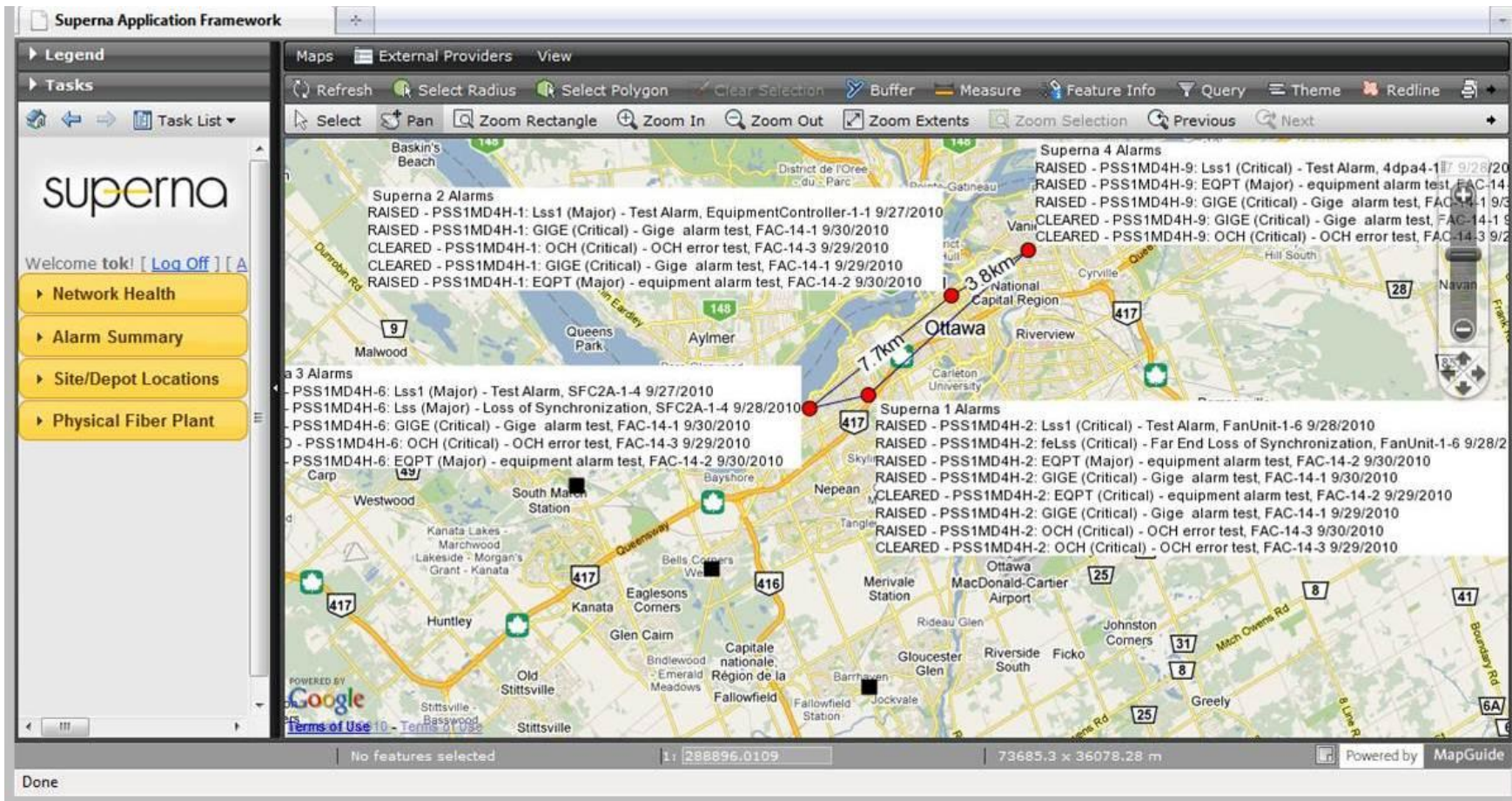
Geospatial Telecom Fault Solution



Cloud Based Demonstration

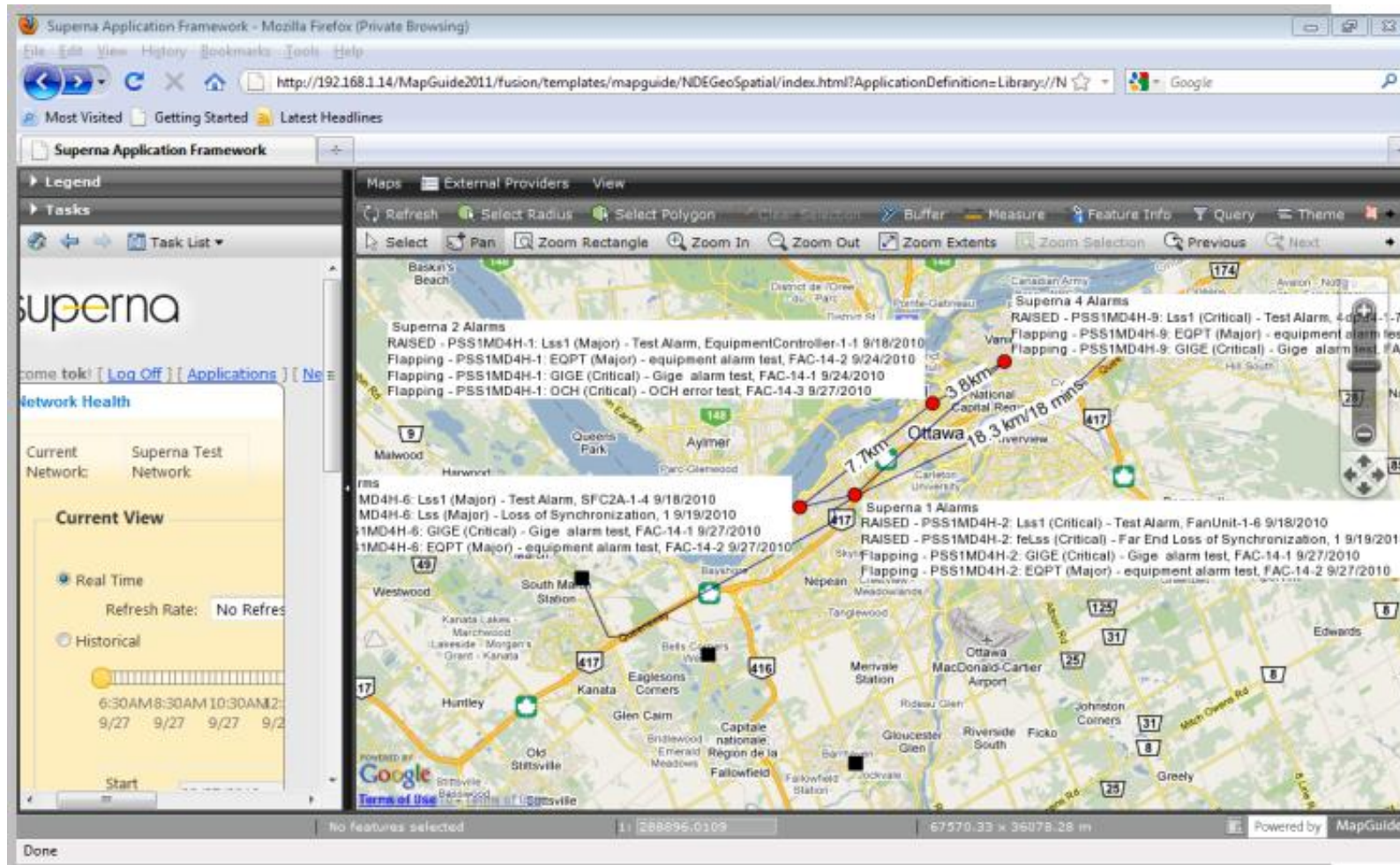


Location-Aware Application Monitoring, Spares Management



Spares routing based on open geospatial framework
Correlation analysis linked to analysis of optimal spare depots

Location-Aware Application Monitoring Integration with EMC Ionix



**Cross-domain application monitoring with a geo-spatial framework
Geospatially enabling EMC Ionix**

Summary

- Traditional telecom data models and tools for planning and management have been limited, providing a virtual network view.
- Cloud networks are inherently more intelligent, complex and dynamic. Need to address security.
- Network planning and management applications must leverage Web-based, spatial-enabled technology to scale application usage.
- Web services–based tools facilitate creative use of spatial technology, to empower employees from Sales to Maintenance.