CLOUD BASED CENTRAL MANAGEMENT SOFTWARE
OPENING THE DOOR TO REGIONAL DATA SHARING

Presented to
ITE Joint Western and Texas District Meeting
Keystone, Colorado
June 26, 2018
PRESENTATION OVERVIEW

• Background fits
• Development of Specifications
  • Desired Benefits
  • Guiding Principals
• Procurement
  • Challenges
• The Solution
• Cost
• What’s Next
• Summary
BACKGROUND
CITY OF DALLAS NEEDS

• Existing system installed in the 1980s
• Equipment is obsolete and no longer supported
• 9600 baud analog modems (one of a kind – cable TV)
• Cannot communicate with contemporary equipment
REGIONAL NEEDS

• Increased demand to share data with other Agencies
  • Regional corridor timing coordination
  • Regional event planning and operation
  • Incident response
• Increased demand to provide data to 3rd parties
• Increased need for regional level data analytics
Supporting Activities

- Local controller hardware and software specifications – 2011
- Procurement of new local hardware and software – 2012
- Procurement of center to field communications devices – 2014
- Installation of new hardware and software – 2015
- Total number currently deployed - ~775
DEVELOPMENT OF SPECIFICATIONS
REGIONAL COLLABORATION

- Total Number of signalized intersections ~2500
DESIRED AGENCY BENEFITS

• Leverages staff resources
• Improved incident and special event management capabilities
• Increased efficiency of maintenance and trouble call activities
• Increased available data and analysis tools
• Increased user access to system
• Single Graphic User Interface for managing multiple applications e.g., school flashers, dynamic message signs, video cameras, and others
• Adaptable to new technologies and applications
Desired Regional Benefits

• Support secure data sharing with public and private partners and applications like Autonomous Vehicles
• Provides single conduit for sharing data
• Improves uniformity of signal operations on regional corridors
• Provides flexibility of individual agencies to select independent applications
• Allows adjacent agencies to view and control signals along shared corridor
• Provides opportunity for data analysis on regional level
GUIDING PRINCIPALS

• Modular
• Minimum project life of ten years
• Common GUI
• Independent Applications
• Thin Client
• Ability to easily share data between agencies and 3rd parties
GUIDING PRINCIPALS (CON’T)

- Use of “Cloud” to facilitate sharing
- Use of APIs for integration
- Secure
- Easily onboard new applications and agencies
- Lead by System Integrator
Specification Document

- Request for Competitive Sealed Proposals (RFCSP)
- 130+ Pages
- 1000+ Requirements
- Initial applications
  - Common Gui
  - Traffic Management
  - Video Management
  - Asset Management and Maintenance
- Did not dictate a specific design
PROCUREMENT
PROCUREMENT TIMELINE

• Finalization of specification began in 2014
• City of Dallas was procuring agency
• Procurement advertised in May 2015
• Notice to Proceed – October 2017
PROCUREMENT PROCESS

• Lead by City of Dallas
• Partner Cities included on Selection Committee
• Included Compliance Matrix for all requirements
• Required verification of current status of all requirements prior to contract execution
  • Promotes common understanding of requirements
  • Establishes development schedule for 100% compliance which is included in contract.
YOU ARE NOW ENTERING A STRESS FREE ZONE

CHALLENGES
Challenges

• Cutting Edge Concept
  • Thin Client – data in the Cloud
  • Resistance to Change
  • Open APIs not common in Transportation Industry

• Initial Resistance from IT Department
  • Resistance turned to support as IT began converting all City of Dallas software to thin client / cloud based
  • Desire to eliminate City Hall data center

• Perceived High Cost
Challenges

• Industry Acceptance
  • Where told it wouldn’t work
  • Concern over operating real time system in the Cloud.

• Vendor teams finding “best solution” applications with published APIs
  • Supporting maximum flexibility for other agencies

• SCADA compliance (implementation challenge)
  • Homeland Security - Signals are command & control
  • Secure connection between field device / City Hall / Private Cloud
THE SOLUTION
SYSTEM INTEGRATOR

• Ericsson selected as System Integrator
• Approved by Dallas City Council – August 2017
• Ericsson will provide Common GUI
• Application Partners
  • Intelight – Traffic Management Application
  • Teleste – Video Management Application
• Ericsson will integrate City provided Asset Management Application (Maximo)
SCHEDULE

- NTP – October 2017
- Two year schedule
- Phase 0
  - TMS in the cloud (existing functionality)
  - 600+ intersection on-line in 60 days
- Phase 1
  - TMS Feature Set 1 (increased functionality)
  - GUI Feature Set 1
- Phase 2
  - TMS Feature Set 2
  - GUI Feature Set 2
  - VMS Feature Set 2
- Phase 3
  - TMS Feature Set 3
  - GUI Feature Set 3
  - VMS Feature Set 3
  - AMS Feature Set 3
- Phase 4
  - Final Bug Fixes
  - Final Regression Testing
  - Final Acceptance
SYSTEM ARCHITECTURE

• Cloud based applications
  • GUI
  • Traffic Management Application (MaxView)
  • Asset Management Application (Maximo)

• Asset Management Application located in separate City cloud

• Locally housed applications
  • Video Management Application (Teleste)

• School Flasher application may be added soon

• Includes Testing Environment
Ericsson invests in helping cities transform
Platforms designed to provide real-time secure data exchange for multiple domains

City Planners
Public Safety
Data Brokers e.g. V2X
Information Center
Traffic Management Center GUI
Maintenance Staff
Citizens e.g. Traveler Information Systems
Train Operators

Benefit from your ecosystem
Optimize your Operation using current infrastructure

Sensors e.g. environment
Variable Message Signs
Traffic Signals
Cameras
Street Lights
Parking
Work force
Buses
Trains
Network Security

NIST SP800-82 provides framework for cyber resiliency Defense in depth approach
PROJECT COST

- Total 10 year Cost -
  - Acquisition (Integration and equipment) $ 6,352,990.03
  - Maintenance $ 3,523,537.71
  - ATCs $ 2,700,000.00
  - Cameras $ 625,000.00
  - Center to field Communication Equipment $ 1,500,000.00
  - Total Ten Year Cost $14,701,527.74

- Average Cost Per Intersection $ 9,801.02
WHAT’S NEXT
Near Term Integrations

• School Flashers
• AVL
• Individual cabinet components
  • Wavetronics
• Intra-Department systems
  • Lane Closures
  • CAD
• 3rd Party Information Providers
  • DFW 511
  • Waze
Future Integrations – Connected Vehicles (V2X)

Vehicle-to-infrastructure (V2I)
- e.g. traffic signal timing/priority

Vehicle-to-network (V2N)
- e.g. real-time traffic/routing, cloud services

Vehicle-to-vehicle (V2V)
- e.g. collision avoidance safety systems

Vehicle-to-pedestrian (V2P)
- e.g. safety alerts to pedestrians, bicyclists
Connected Vehicles – Conceptual Architecture

CMSS (Regional)
- Ericsson CUT
- MAXVIEW config
- MAXVIEW CV
- Realtime I2X

Data Broker

ATC Controller
- MAXTIME
- NTCIP

TxDOT

Traveler Information System
- e.g. 511DFW

Bi-directional value

Traffic Mgs aligned with standard

C2C

API
Future Integration – Autonomous Vehicles

- Ericsson’s Connected Urban Transport (CUT) platform already contains the elements required for managing autonomous vehicles
- Currently being used in Sweden in a Unique six month installation designed to test self driving buses in open roads with typical traffic situations
CLOSING SUMMARY

• Regional vision
• Modular application approach
• Truly thin client architecture
• Secure Cloud based traffic data ready to share
  • 3\textsuperscript{rd} party applications
  • Other agencies
• Ready for the future
QUESTIONS

Kirk Houser, P.E.
City of Dallas Department of Transportation
kirk.houser@dallascityhall.com

Gary Jost, P.E.
TEAL Engineering Services, Inc.
gary.jost@tealeng.com