Project 5.6
Facilitating the Use of Open Source Software

Goal: Introduce and discuss opportunities for open source software use

May 9, 2012

Agenda

- **Welcome and introductions**
- North/West Passage and project background
- Agency developed open source software
- Barriers and benefits to open source software
- An example: IRIS
- Applicability to North/West Passage states
- Wrap-up and next steps

Welcome and Introductions

- Presenters
  - Dean Deeter, Athey Creek Consultants
  - Jim Kranig, Minnesota DOT
  - Mike Mah, City of Chandler, Arizona
  - Tomas Guerra, Oz Engineering
  - Vince Garcia, Wyoming DOT

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North/West Passage and Project Background

- North/West Passage
  - Transportation Pooled Fund 5(093) program established in 2003
  - States from WA to WI along I-90/1-94
  - Develop effective methods for sharing, coordinating, and integrating traveler information and operational activities across borders
- States share common challenges
  - Commercial and recreational travel corridor
  - Extreme weather conditions
  - Road closures and transportation management

North/West Passage and Project Background

- Project 5.6 Facilitating the Use of Open Source Software
  - Educate states on the availability
  - Explore potential applications within the corridor
- More program and project information online at www.nwpassage.info

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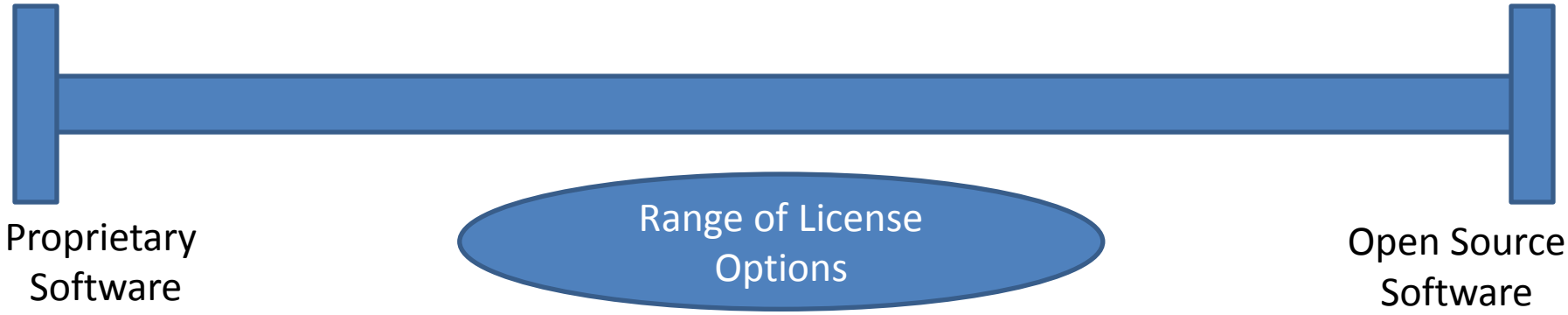
Agency Developed Open Source Software

There is a spectrum of software ownership options

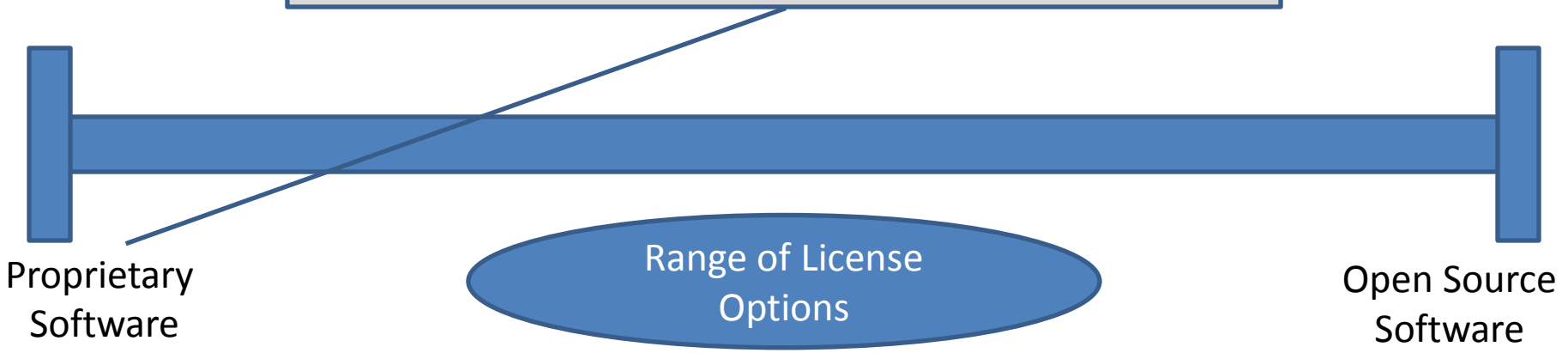


Agency Developed Open Source Software

Spectrum of Software Ownership Options

Proprietary Software:

- Circulation for use, but not for modifying / enhancing
- Includes ‘off the shelf’ (e.g. MS Word)
- Includes contractor developed products

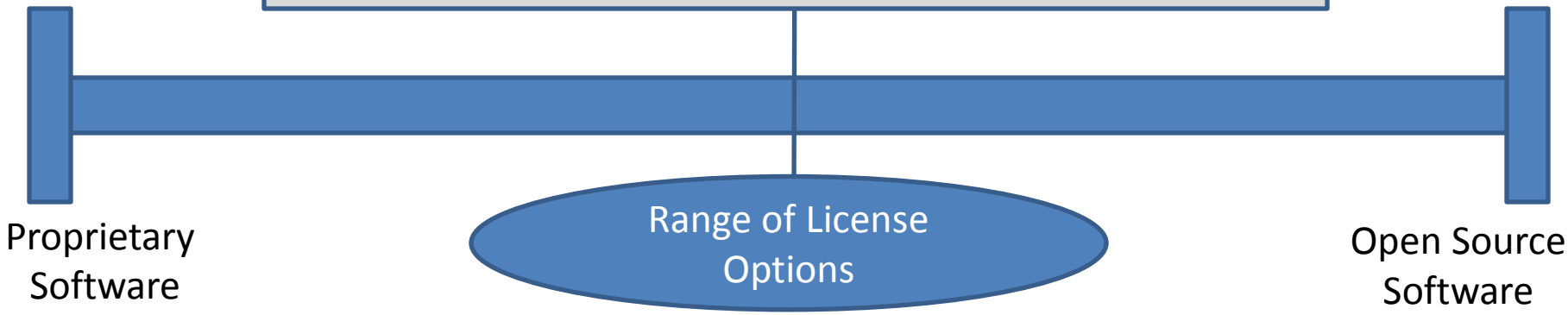


Agency Developed Open Source Software

Spectrum of Software Ownership Options

Range of License Options:

- May include:
  - License to modify but not redistribute
  - License to allow other contractors to modify if they sign a non-disclosure agreement
  - Joint ownership of software

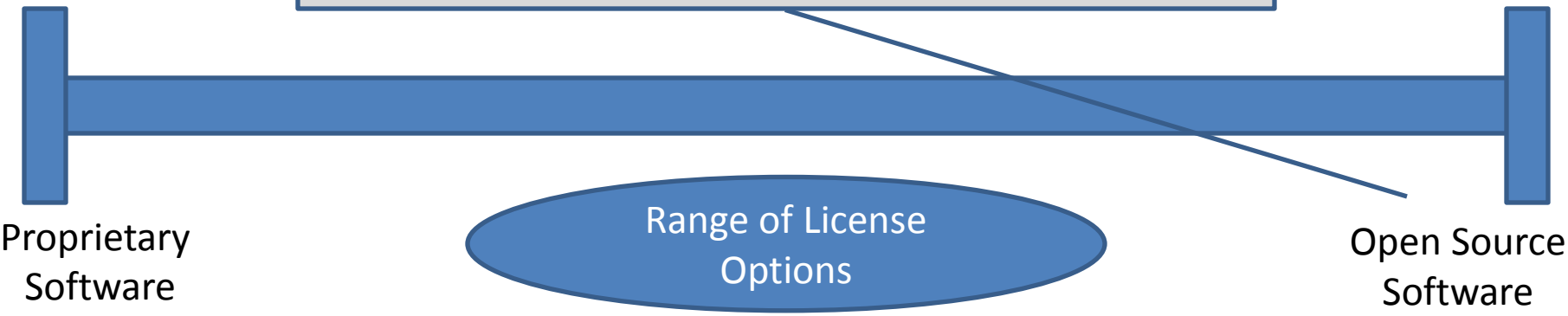


Agency Developed Open Source Software

Spectrum of Software Ownership Options

Open Source Software:

- Freedom to run
- Freedom to study
- Freedom to improve
- Freedom to redistribute
- Source code circulated with the software



Agency Developed Open Source Software

- GPL (General Public License)
  - Specific form of open source license
  - Not public domain
  - Copyrighted
  - Copylefted
    - If someone modifies the software and distributes it, they must do so as Open Source GPL Licensed
  - GPL Licensed Software does not need to be distributed at no cost (it can be sold)

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Barriers to Open Source Software

- Agency Developed Open Source Software
  - Deployment and operation requires local configuration and adaptation
    - Could be DOT IT staff
    - Could be a contractor
  - An adequate budget is still needed
  - Agencies unfamiliar with open source software may be uncomfortable with the uncertainties

Other thoughts?

Benefits to Open Source Software

- Proprietary software has typically been developed through an investment of one company
- Software company needs to charge a price to regain their investment and make a profit
- Once open source software is initiated, the software community contributes to it, typically allowing lower costs of deployment

Benefits to Open Source Software

- This may results in:
  - Cooperative software development / sharing of ideas
  - New modules added by one user that other users may not have thought of
  - Lower costs for initial deployment and ongoing maintenance (not no-cost)
  - Wider ‘pool’ of software companies familiar with the software, increased competition

Other thoughts?

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An Example: IRIS

Jim Kranig
Minnesota DOT

Minnesota's decision to release IRIS as open source software

An Example: IRIS

Mike Mah, PE, PTOE
City Transportation Engineer
City of Chandler, Arizona

Chandler's need for Travel Time/DMS control software

Arterial & Freeway Travel Time Information

- Chandler posted travel time information on three arterial dynamic message signs (DMS)
- Chandler became the first city in the U.S. to post travel times on DMS on arterial roads prior to reaching the freeway
- Project was put into operation in June 2011

Background

- State DOTs typically use loop detectors to measure freeway speeds; this information is converted to a travel time and posted on DMS
- BUT, speed measurements do not work for arterials due to stop-and-go nature of traffic signals

“Arterial” travel times

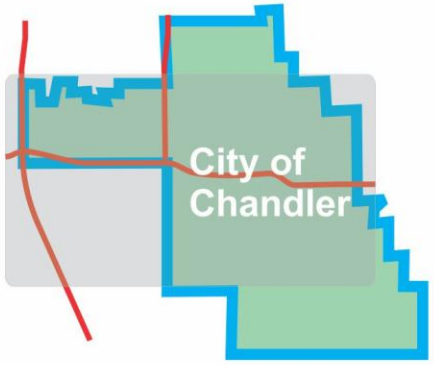
- We use Bluetooth devices carried by drivers and passengers to measure travel times directly

Concept of Operation

- Bluetooth devices can include cell phones, smart phones, tablets, in-car units, etc.
- Anonymous Wireless Address Matching (AWAM) of Media Access Control (MAC) Addresses are matched at each end.
- Travel times are derived from the time stamp differential.

Hardware / software

- Devices are installed on signal/street light poles or in signal cabinets (one at each end).
- Data is brought back to TMC through fiber.
- Bluetooth devices and AWAM software provided by TPA (Toronto).
- OZ Engineering systems integration.



1 Chandler Blvd

2 Price Road

3 Arizona Ave

Facing
Dynamic Message Signs

Routes Advised by DMS

Bluetooth Sensors

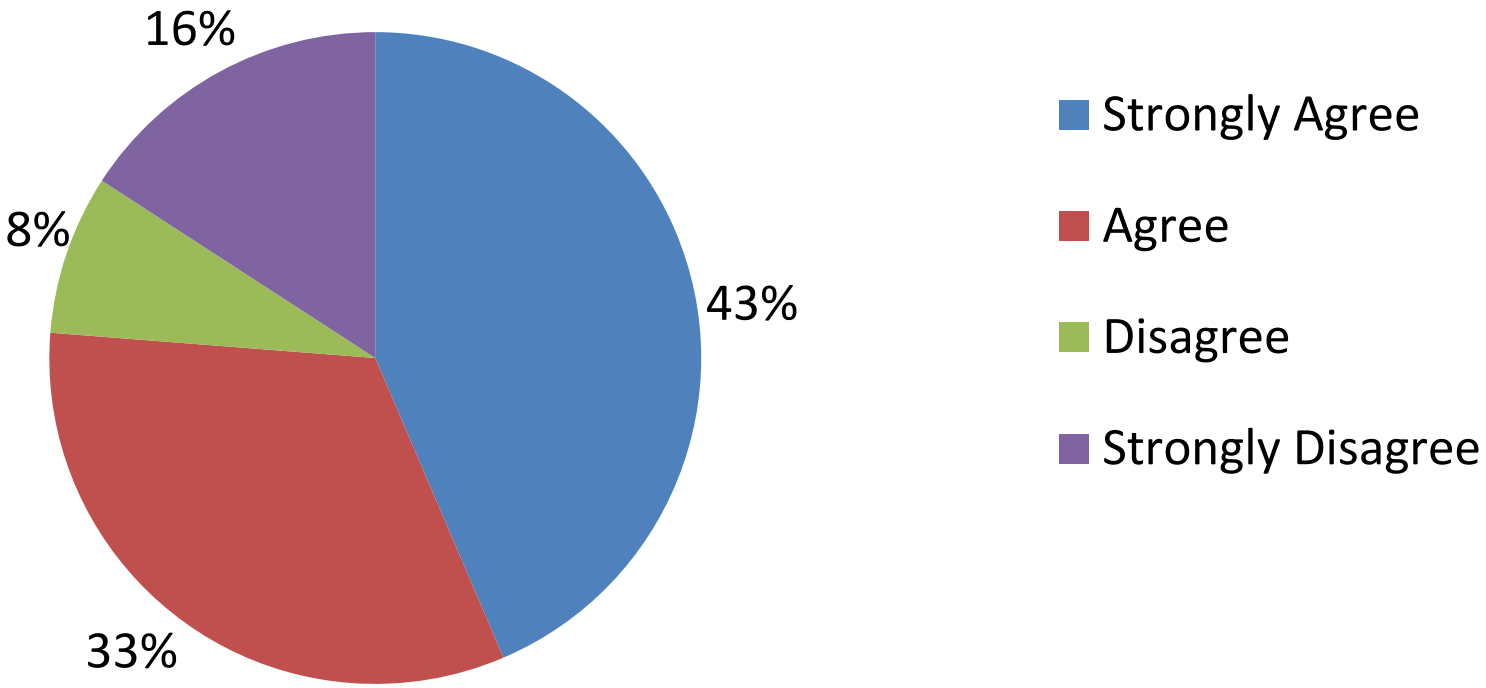
OZ Engineering

Sign Operation

- Hours of Operation: 6 a.m. to 7 p.m. Mon to Sat
- In case of incidents, can provide alternating panels displaying both ‘travel time’ and ‘incident ahead’ type messages
- A public survey was prepared on the City’s web site to seek public input

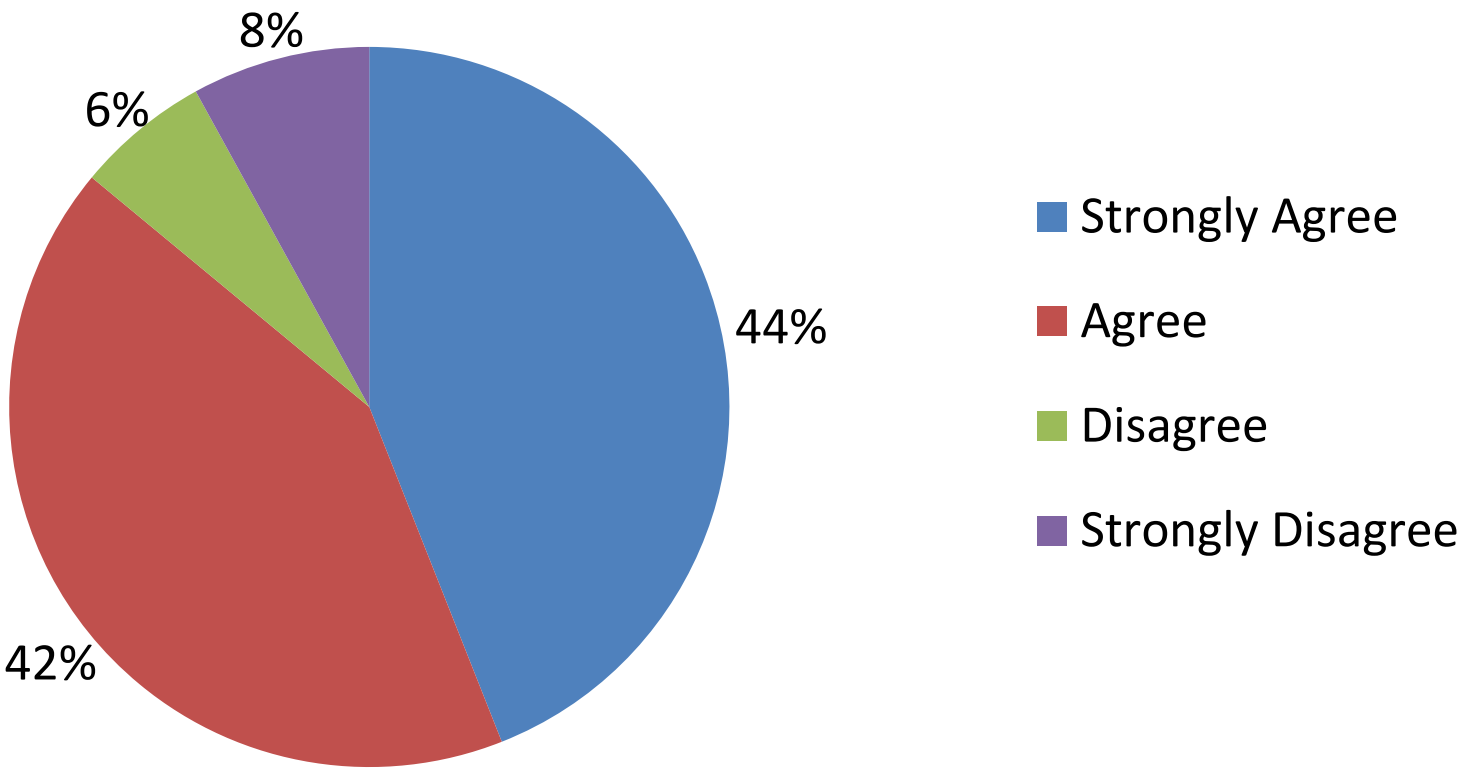
Do you find the travel time information

Helpful? 76% said Yes



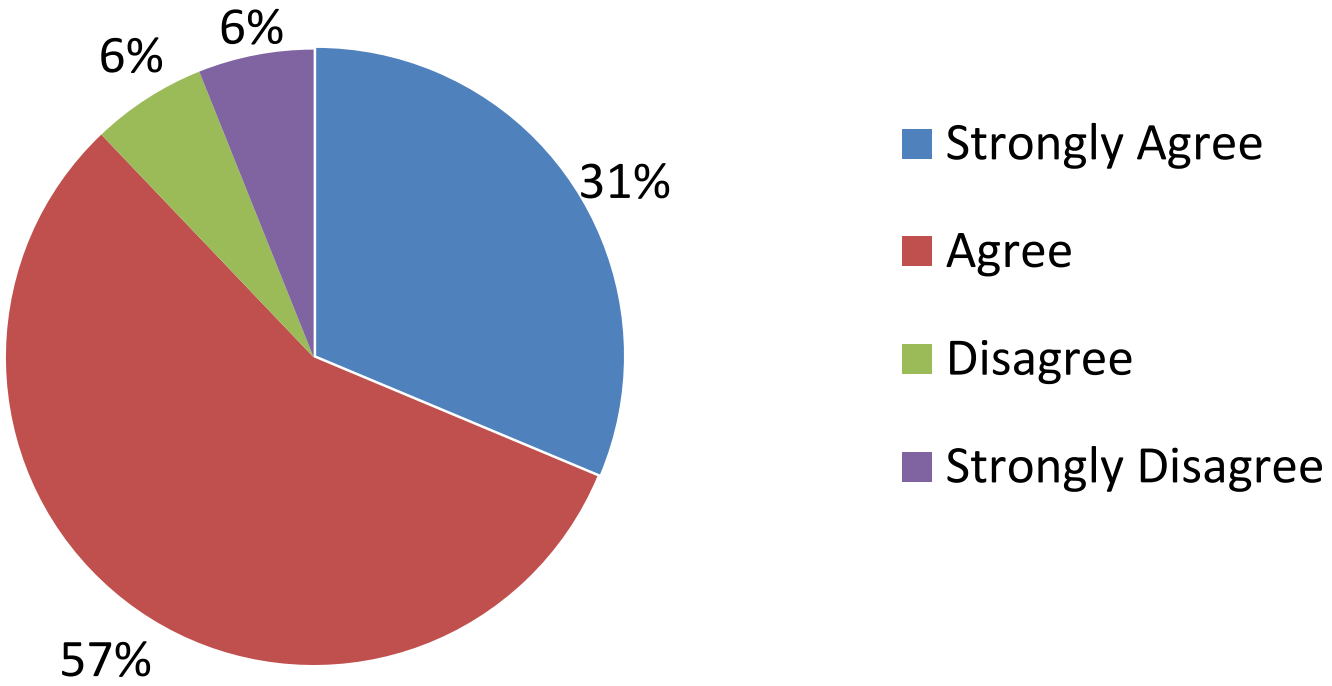
Is the travel time information

Easy to Understand? 86% said Yes



How Accurate

do you find the travel time estimates? **88% Agree**



An Example: IRIS

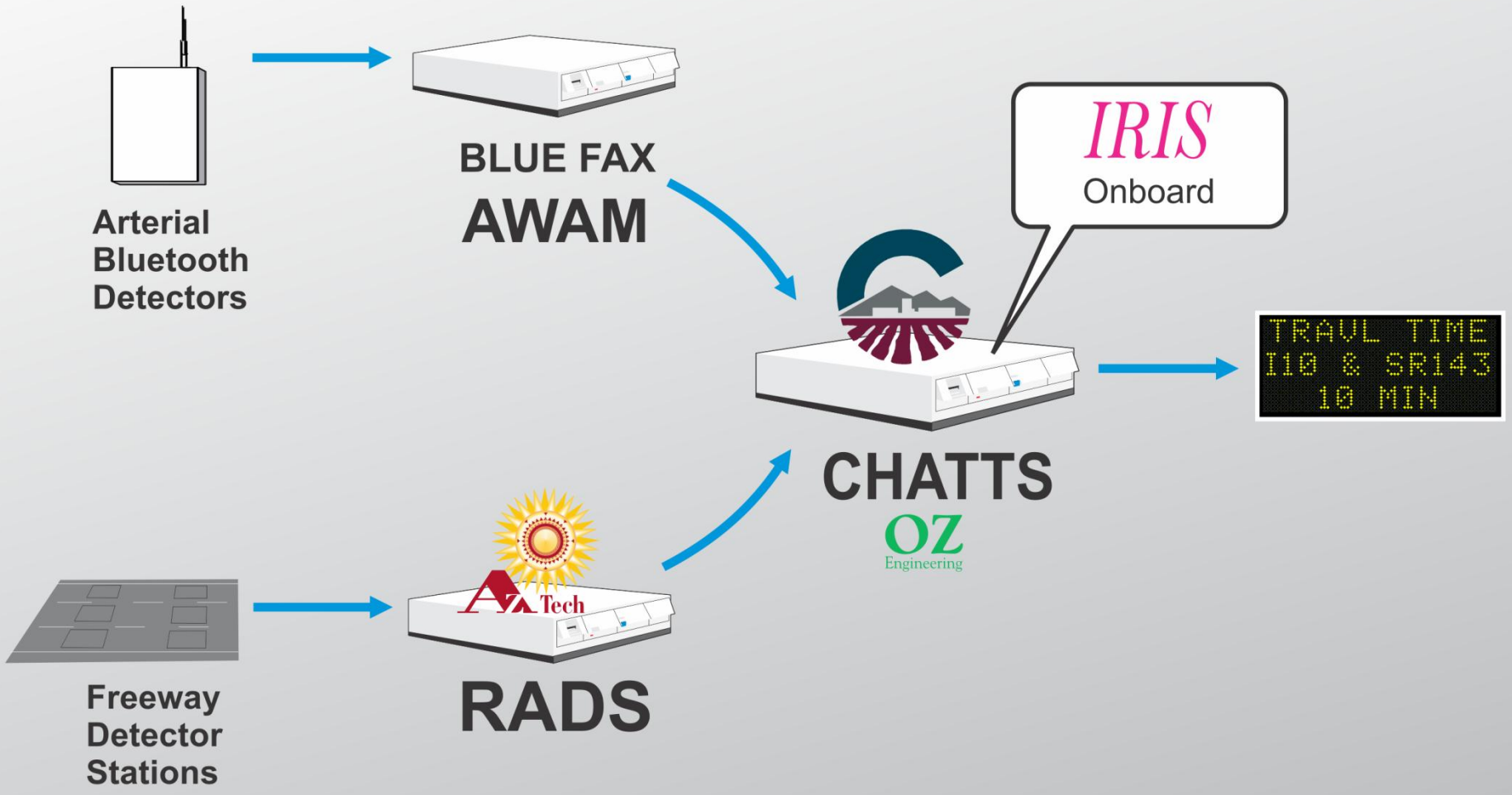
Tomas Guerra
Director of Development
OZ Engineering

OZ Engineering's selection and integration of IRIS for Chandler

OZ Engineering

- Regional ITS integration since 2000
- Arizona DOT Freeway Management System
  - Freeway Travel Times
  - DMS

Chandler Automated Travel Time System (CHATTS)



The ~~Challenge~~ Opportunity

- Freeway travel times available
- Bluetooth sensors being procured

- One standalone (old) Skyline DMS
- Two DMS being procured

- Short-fuse timeframe (3 months)

DMS Communications and Control

IRIS

- Reliable NTCIP communications infrastructure
- Multi-user access
- Automated Warning System (AWS)
- Reputable / responsive owners
  - MnDOT, Caltrans

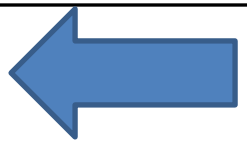
Skyline Vendor Software

- NTCIP compliant communications
- Single-user access
- Vendor-specific

OZ Development

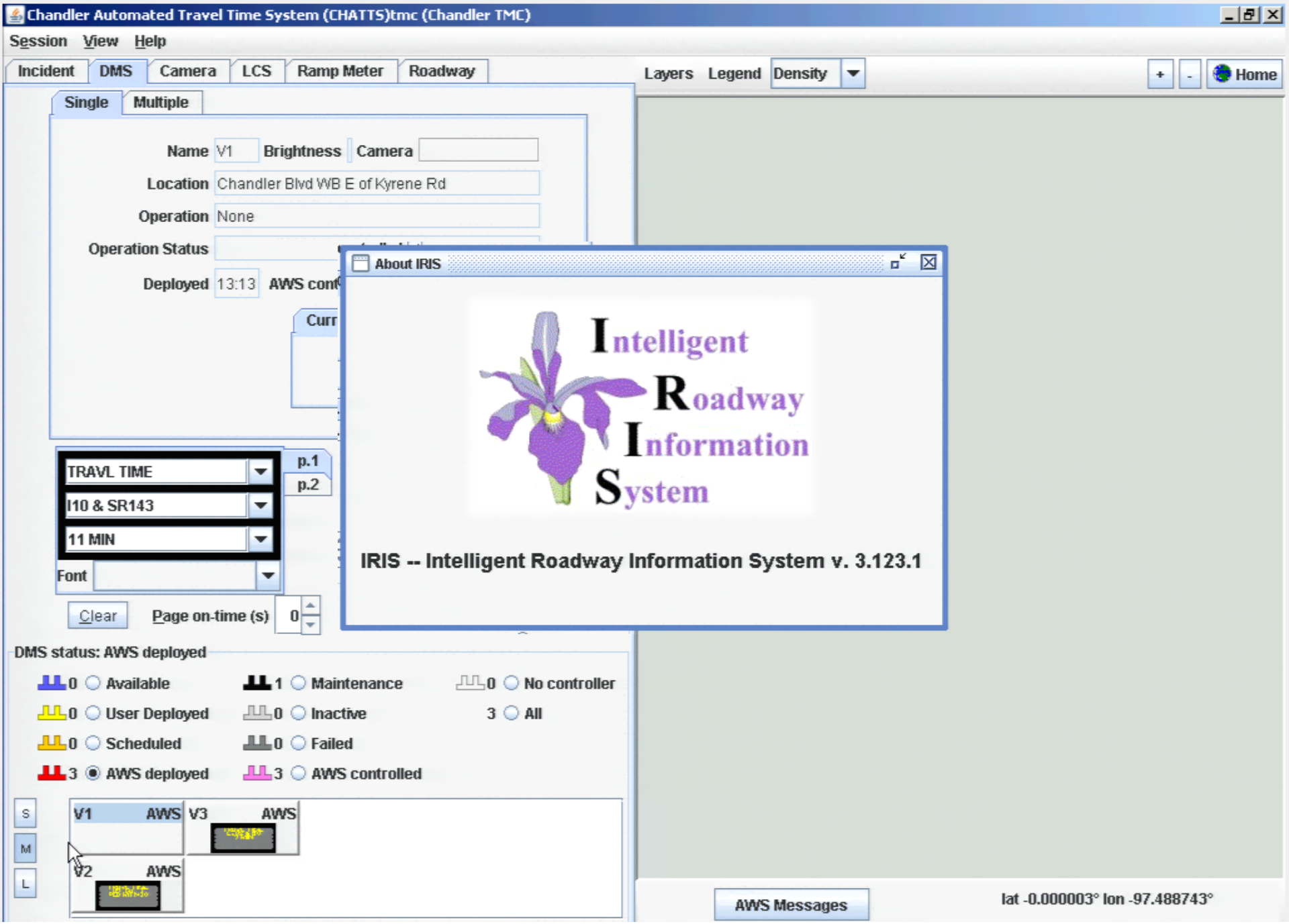
- NTCIP compliant communications
- Significant effort & time

IRIS Devices

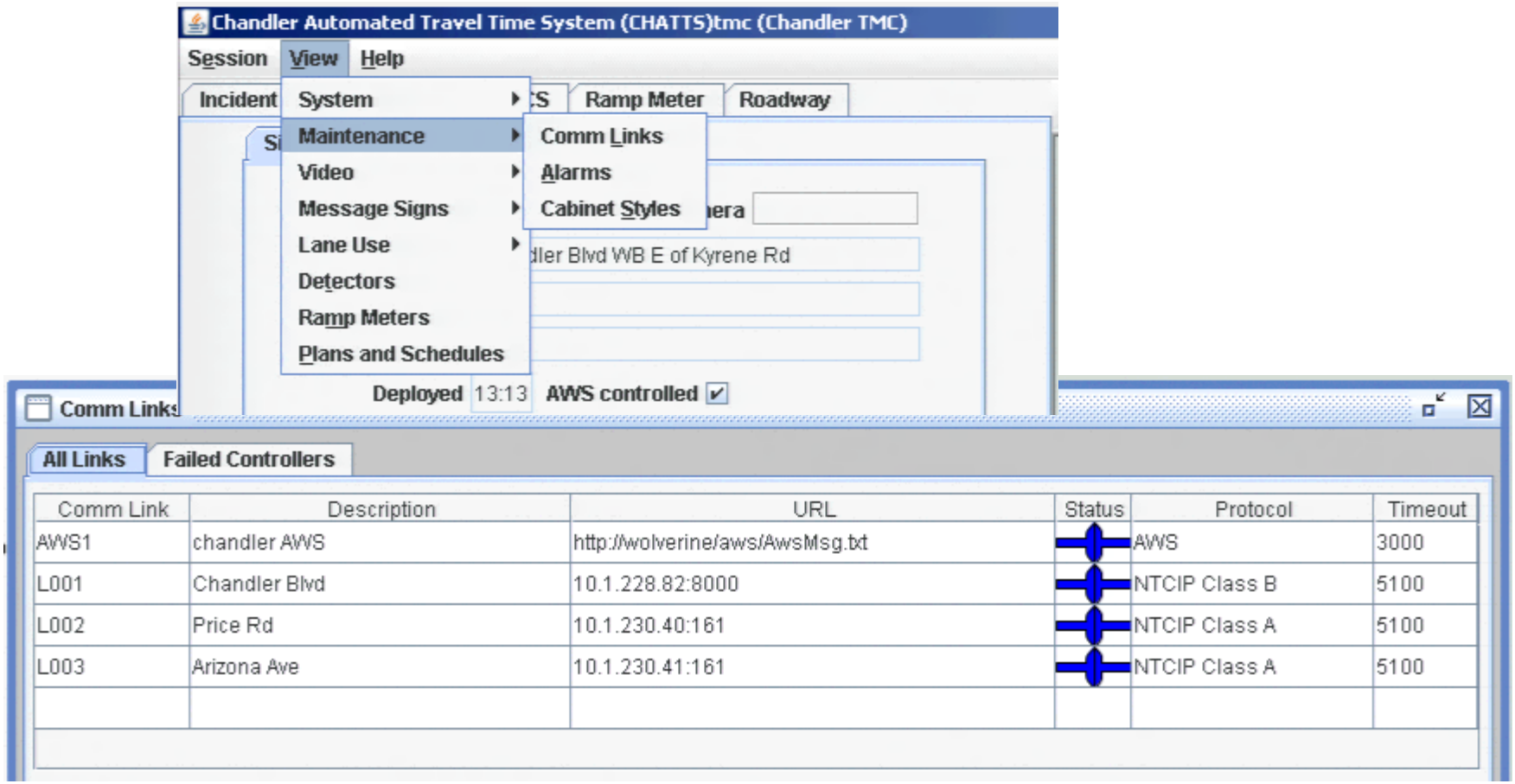
- DMS (dynamic message signs) or CMS 
- Ramp meters
- VDS (vehicle detection sensors)
- LCS (lane-use control signals)
- CCTV cameras (pan/tilt/zoom)
- Video switchers
- In-road lighting (dynamic striping)
- Warning Beacons
- Precipitation Sensors

IRIS Protocols

- NTCIP class A, B and C (DMS)
- DMS-XML (DMS)
- MnDOT 4- and 5-bit (VDS, ramp meters, LCS, beacons, IRL)
- Wavetronix SS105 and SS125 (VDS)
- Canoga Traffic Sensing System (VDS)
- Pelco D (pan/tilt/zoom)
- A/D "manchester" (pan/tilt/zoom)
- Vicon (pan/tilt/zoom)
- AWS (automated warning system)
- Pelco Video Switcher, Vicon Video Switcher
- Optical Scientific ORG-815 (precipitation)


Chandler Automated Travel Time System (CHATTS)tmc (Chandler TMC)
Session View Help
Incident DMS Camera LCS Ramp Meter Roadway
Layers Legend Density
+ - Home
Single Multiple
Name V1 Brightness Camera
Location Chandler Blvd WB E of Kyrene Rd
Operation None
Operation Status
Deployed 13:13 AWS cont
Curr
TRAVL TIME
I10 & SR143
11 MIN
Font
p.1
p.2
Clear
Page on-time (s) 0
DMS status: AWS deployed
0 Available
1 Maintenance
0 No controller
0 User Deployed
0 Inactive
3 All
0 Scheduled
0 Failed
3 AWS deployed
3 AWS controlled
S
M
L
V1 AWS
V3 AWS
V2 AWS
AWS Messages
lat -0.000003° lon -97.488743°
About IRIS
Intelligent
Roadway
Information
System
IRIS -- Intelligent Roadway Information System v. 3.123.1

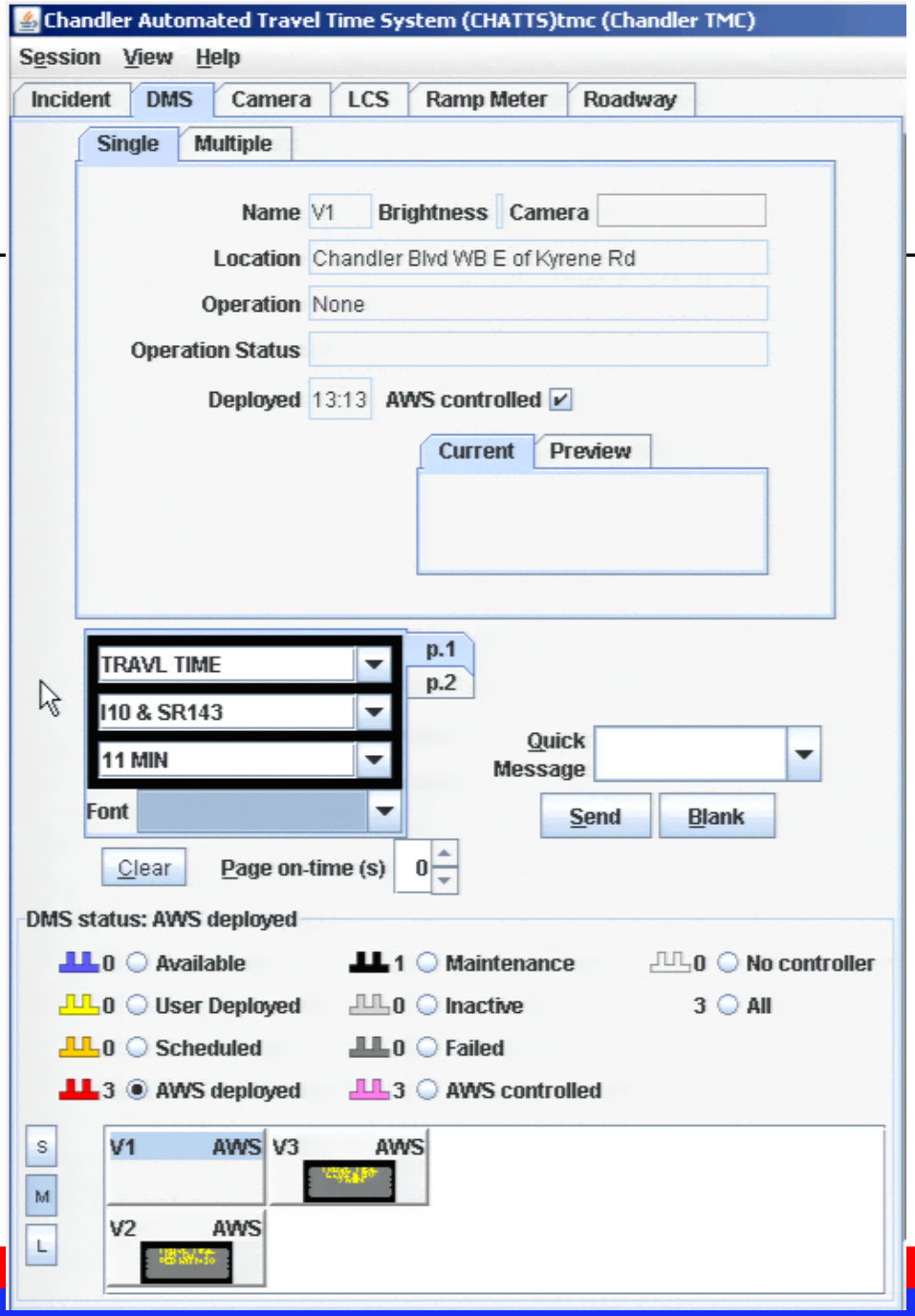
Communications Links



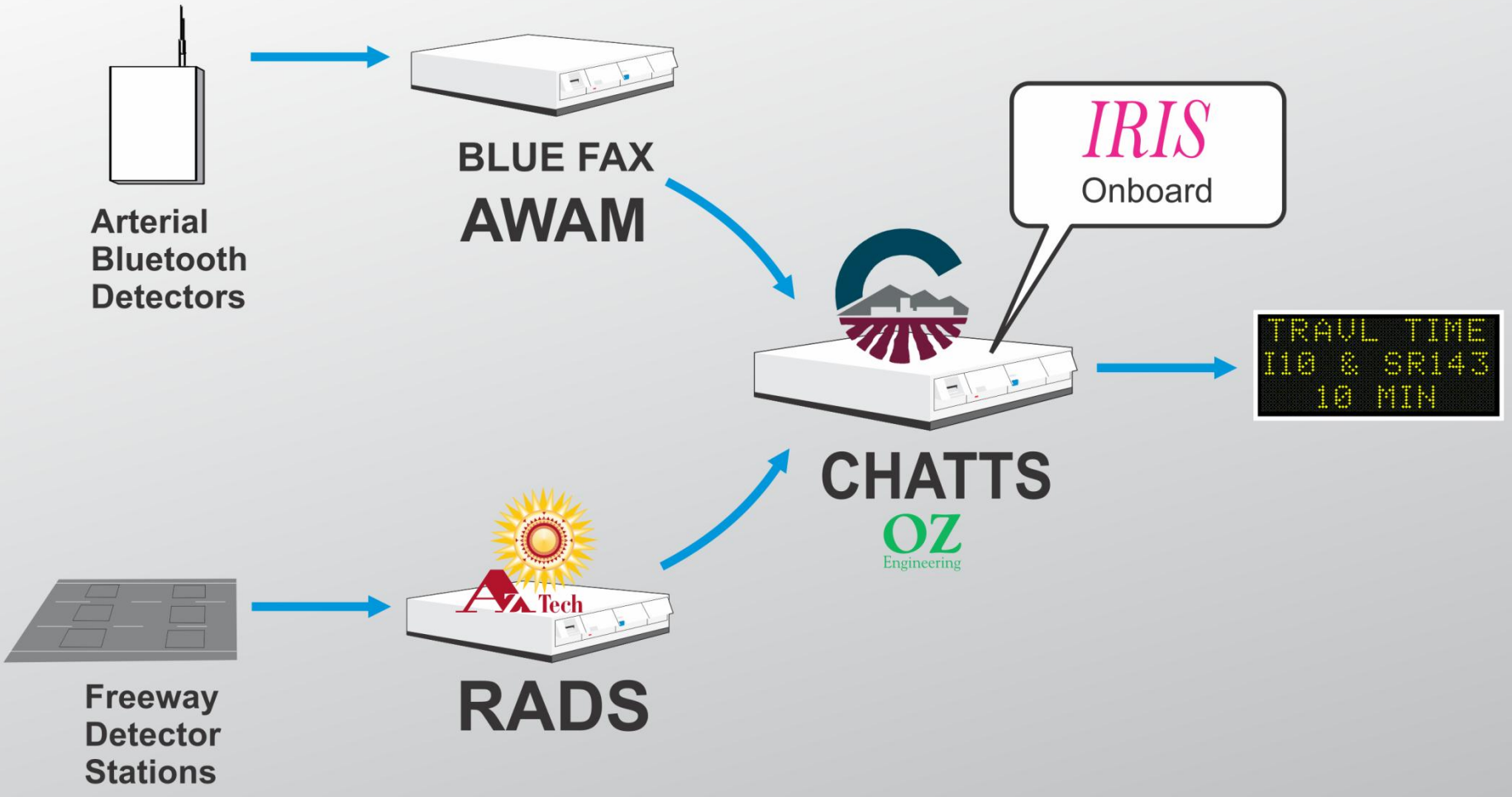
Comm Link	Description	URL	Status	Protocol	Timeout
AWS1	chandler AWS	http://wolverine/aws/AwsMsg.txt		AWS	3000
L001	Chandler Blvd	10.1.228.82:8000		NTCIP Class B	5100
L002	Price Rd	10.1.230.40:161		NTCIP Class A	5100
L003	Arizona Ave	10.1.230.41:161		NTCIP Class A	5100

North/West Passage

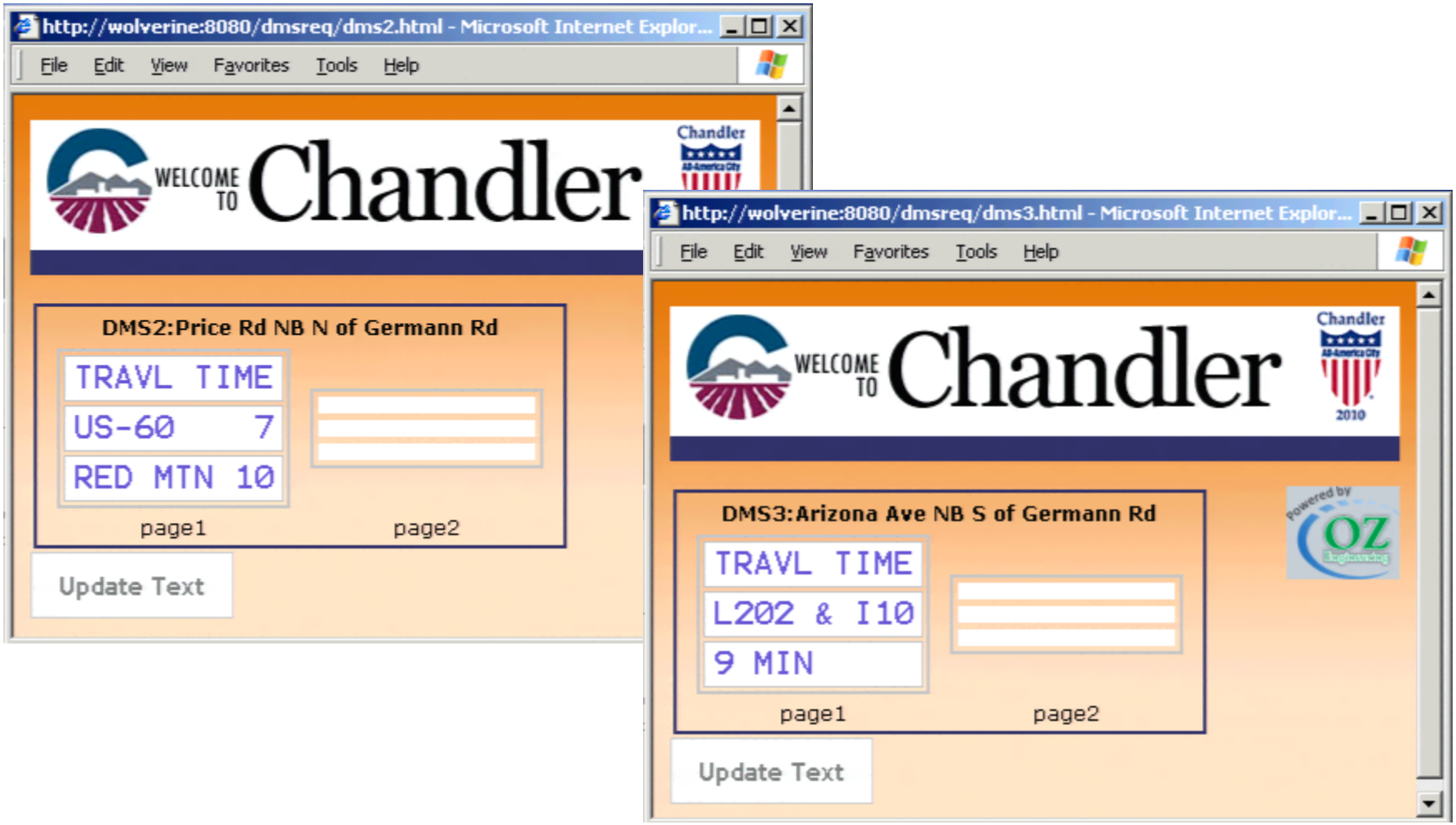
DMS



Chandler Automated Travel Time System (CHATTS)



Monitoring & Control



IRIS Benefits

- Saved us 2 – 3 MONTHS effort
- Any competent coding house can implement
- Not tied to a vendor
- Reputable / responsive owners
  - MNDOT, Caltrans
- Disciplined / documented revision process
- Benefit to Community

An Example: IRIS

Vince Garcia
Wyoming DOT

Wyoming's assessment of IRIS

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Applicability to North/West Passage States

- Round robin on states' impressions
  - Any further thoughts on barriers? Benefits?
- Discuss additional support for the states
  - Should there be further discussions or information prepared about states using **IRIS**?
  - Should there be additional research on **other open source software**? For what uses – traffic management, transit operations, maintenance operations or others?
  - Is there a need for more **guidance on how to approach** open source software as an option?

Wrap-Up and Next Steps

Webinar recording and presentation will be available online at

www.nwpassage.info

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