IRIS ATMS GPL Software

National Rural ITS Conference

August 27, 2013

Jim Kranig
MnDOT

Presentation Outline

- Overview of IRIS Freeway Management System Control Software
- Reasons for sharing IRIS
- Reason for General Public License approach
- Current status
- Vision

IRIS Overview

- IRIS development began with in-house staff starting in the late 1990s:
  - In preparation for moving to the new center
  - To comply with NTCIP standards
  - To support the increased number of field devices
  - To eliminate significant software costs of ongoing licensing and upgrades of the operating system and programs by using open source software
  - To take advantage of the lower cost of required computer hardware resources

IRIS Capabilities (MnDOT)

- Operating 500 mile Twin Cities Freeway Management System
- Dynamic Message Signs (150): monitor & control (incidents, travel times and Amber Alerts)
- Traffic detectors (5500): monitor & archive
- Ramp meters (425): monitor & central control
- Cameras (550): monitor & control
- Incidents: monitor & display
- Lane Control Signals (315): monitor & control
- Delivery of traffic data to MnPass HOT lanes
- Mapping: the above are placed on an interactive map graphical user interface

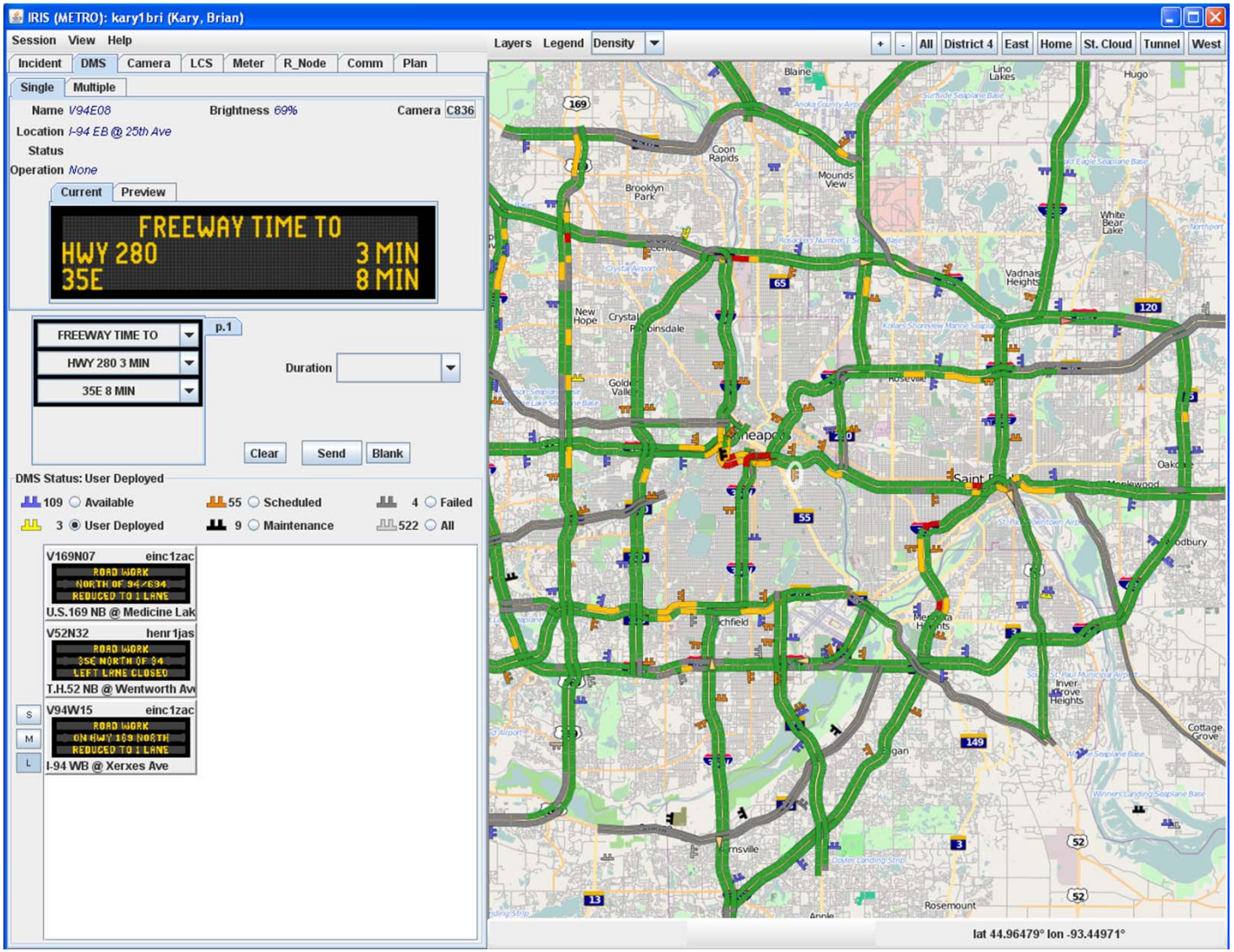
IRIS Software Integrated Features

- GIS Based Mapping
- Graphical User Interface
- Intuitive Menus and eHelp Screens
- Roadway Congestion/Speed Monitoring
- Color Coded Congestion Maps
- Travel Time Calculations
- Analog Video Switch and Camera Control
- Digitized Video Feed and USB Joystick for Camera Control
- DMS Control
- Ramp Metering Control and Configuration
- User Definable Parameters
- Signal System Detector Data
- NTCIP and Serial Communication Protocols
- Device Maintenance/Work Order Module
- Extensive Reporting Facility

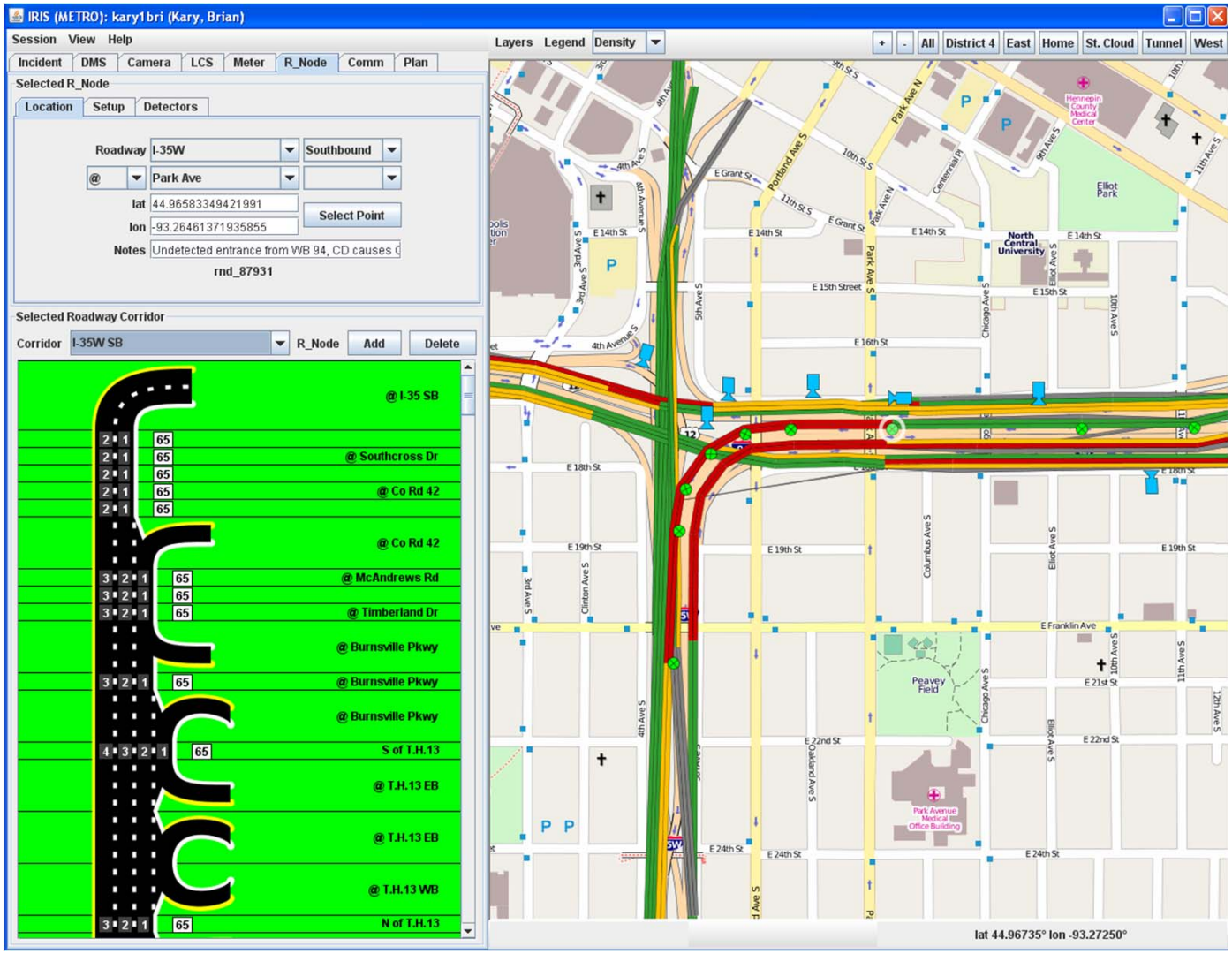
IRIS Development & Ownership

- Developed entirely by MnDOT staff
- Utilizes General Public License (GPL) operating system (Linux)
- Utilizes General Public License (GPL) open source utility software
- Clients can be Linux or Windows

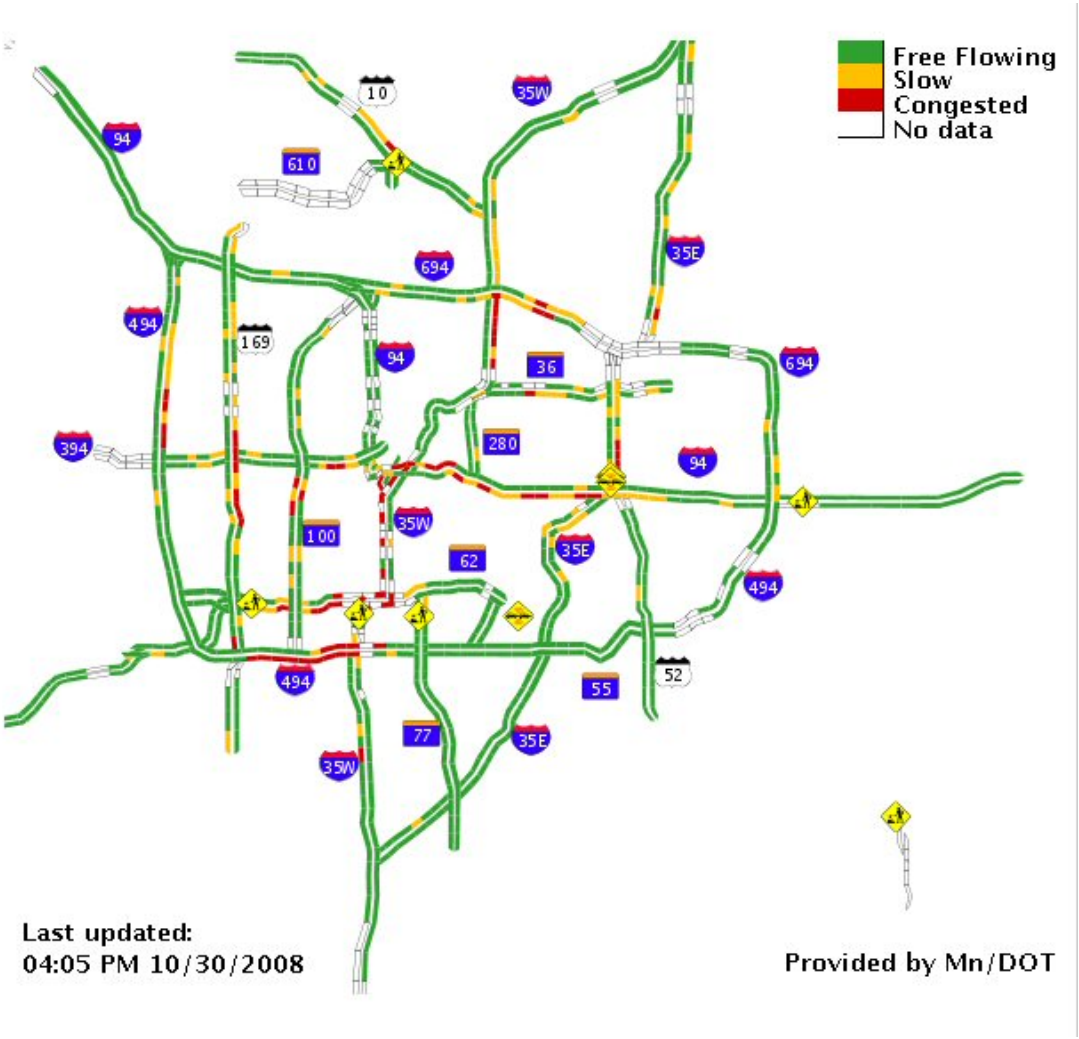
Dynamic Message Signs



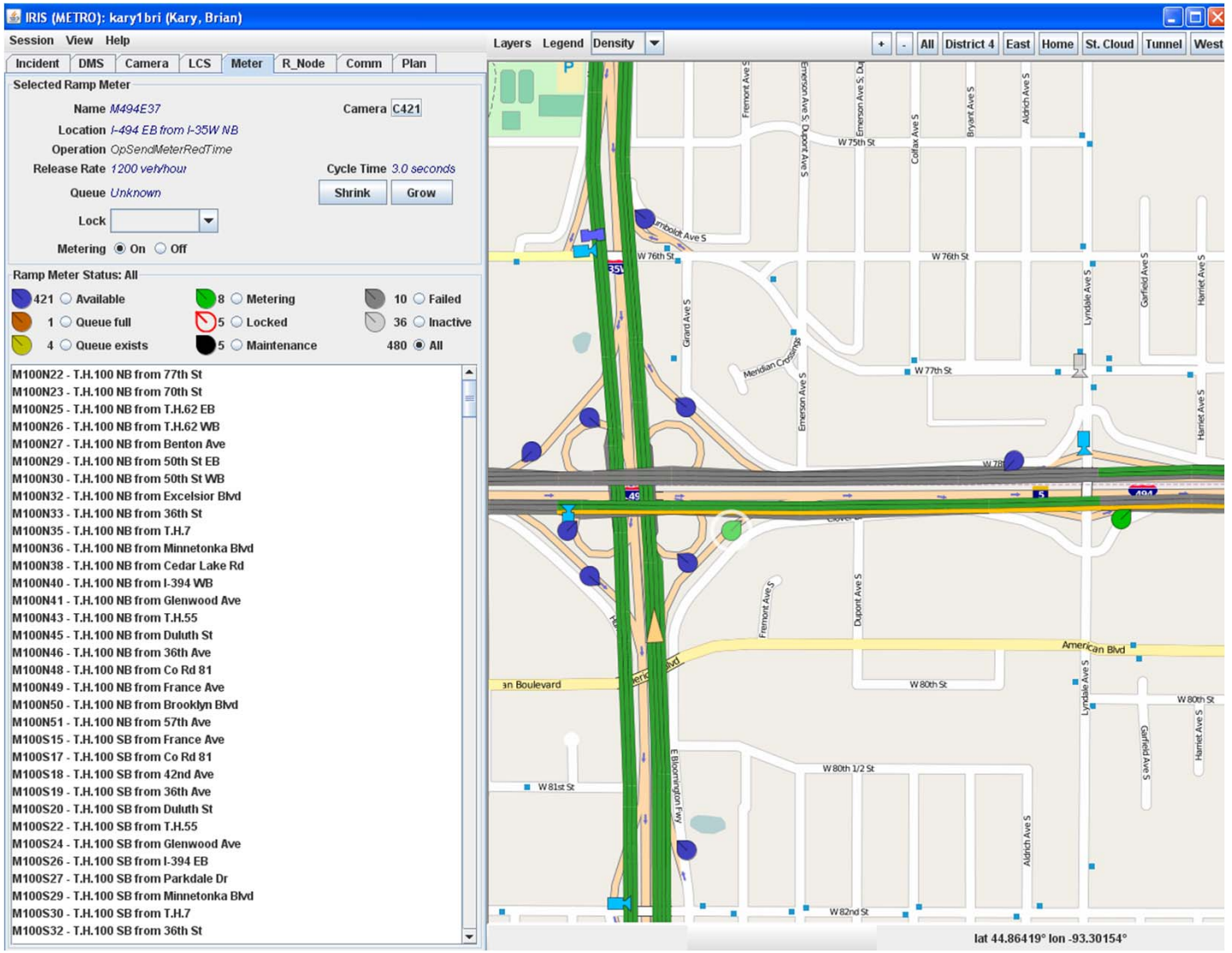
Traffic Detection and Monitoring



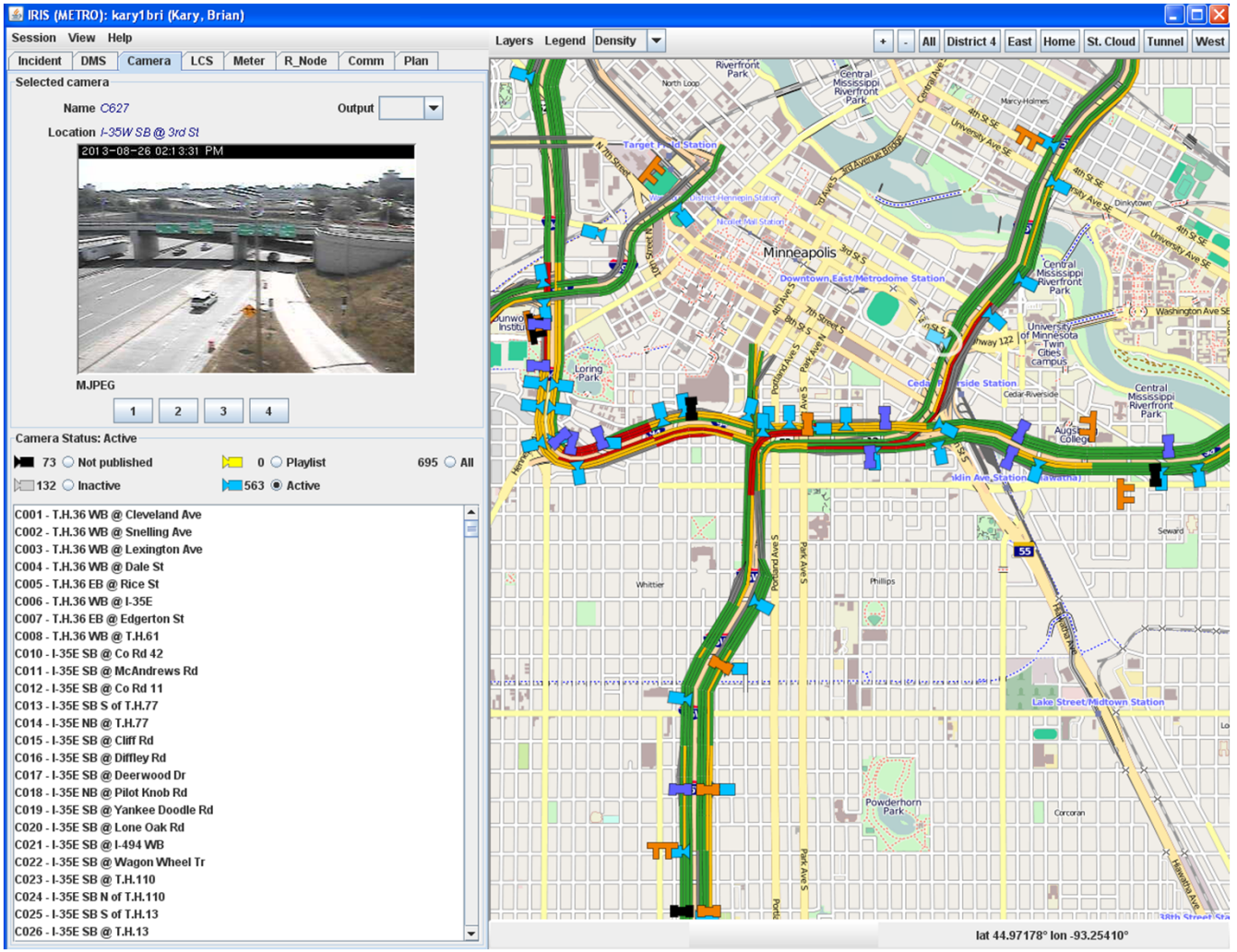
Feeds Data to Traffic Flow Map



Ramp Metering

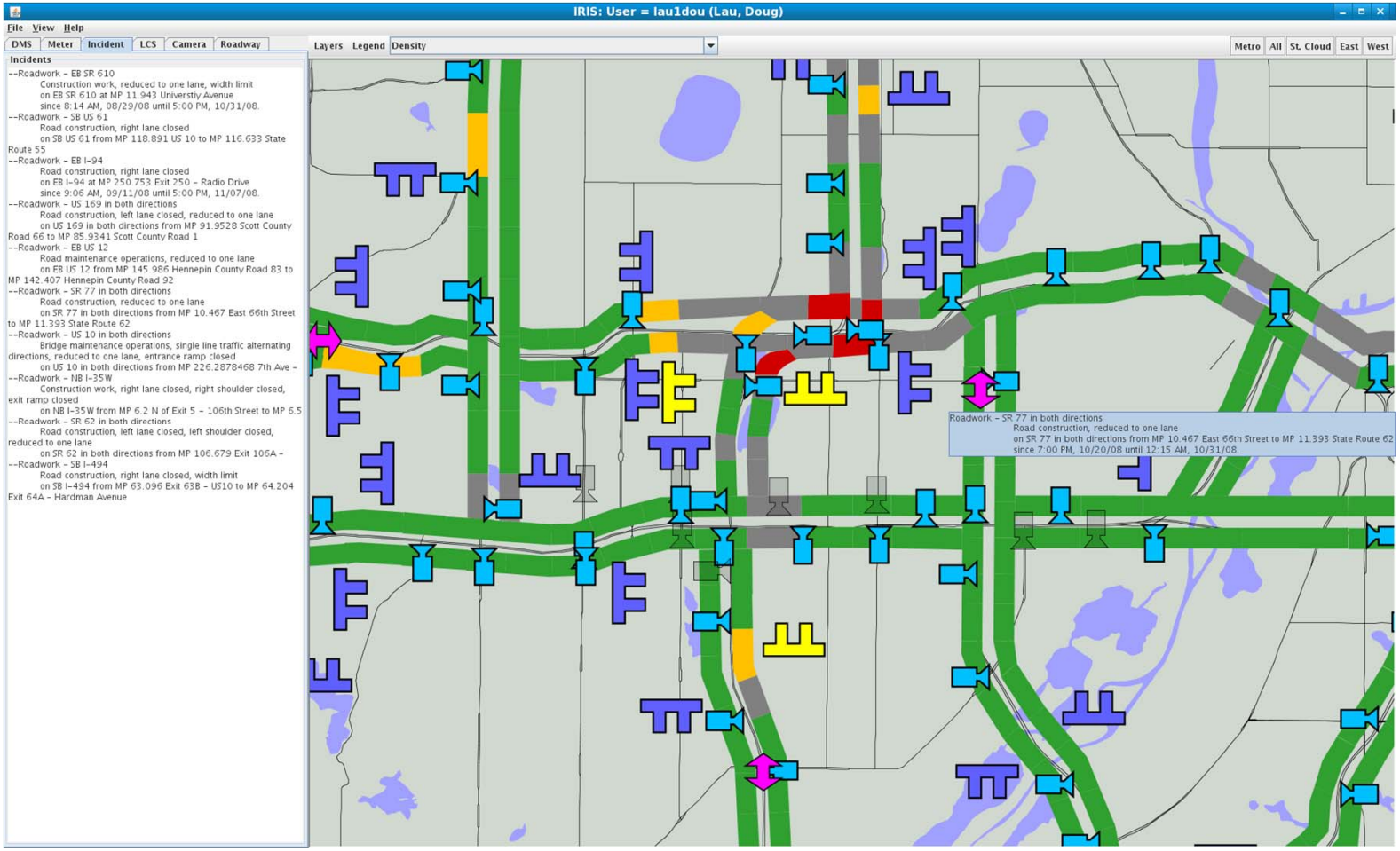


Cameras

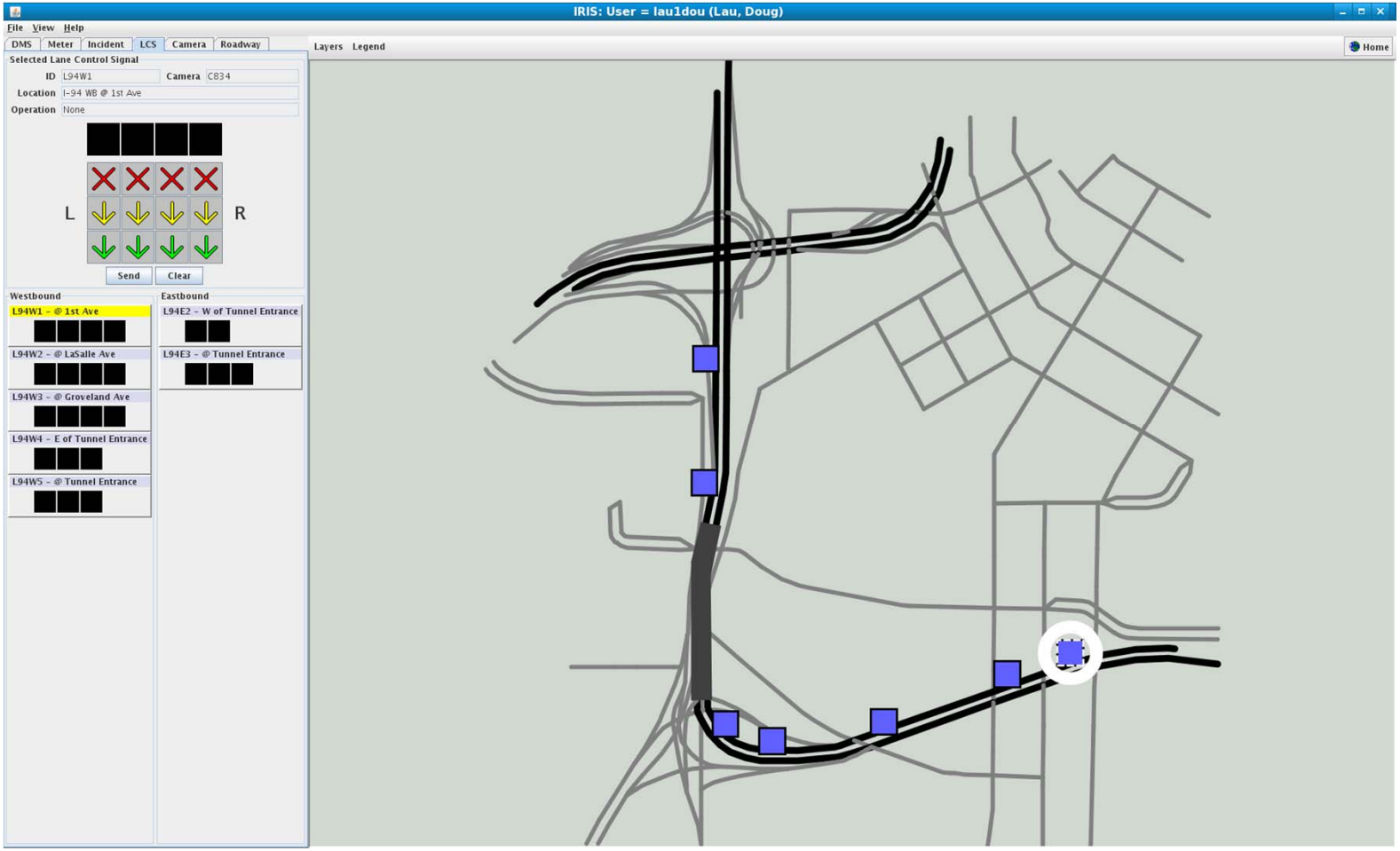


- PTZ control via joystick or on-screen

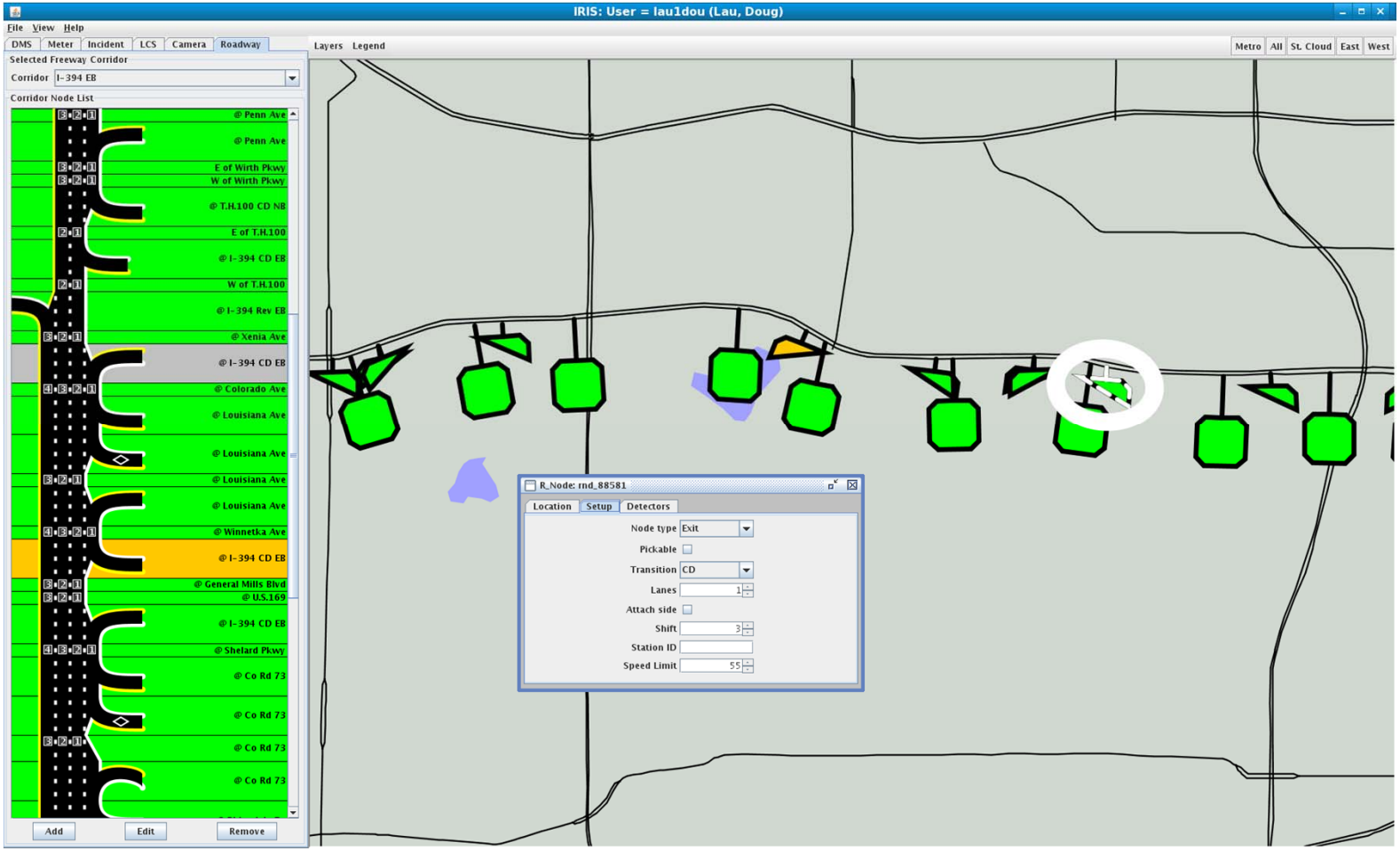
Incidents


IRIS: User = lau1dou (Lau, Doug)
File View Help
DMS Meter Incident LCS Camera Roadway
Layers Legend Density
Metro All St. Cloud East West
Incidents
--Roadwork - EB SR 610
Construction work, reduced to one lane, width limit
on EB SR 610 at MP 11.943 Universtiy Avenue
since 8:14 AM, 08/29/08 until 5:00 PM, 10/31/08.
--Roadwork - SB US 61
Road construction, right lane closed
on SB US 61 from MP 118.891 US 10 to MP 116.633 State Route 55
--Roadwork - EB I-94
Road construction, right lane closed
on EB I-94 at MP 250.753 Exit 250 - Radio Drive
since 9:06 AM, 09/11/08 until 5:00 PM, 11/07/08.
--Roadwork - US 169 in both directions
Road construction, left lane closed, reduced to one lane
on US 169 in both directions from MP 91.9528 Scott County Road 66 to MP 85.9341 Scott County Road 1
--Roadwork - EB US 12
Road maintenance operations, reduced to one lane
on EB US 12 from MP 145.986 Hennepin County Road 83 to MP 142.407 Hennepin County Road 92
--Roadwork - SR 77 in both directions
Road construction, reduced to one lane
on SR 77 in both directions from MP 10.467 East 66th Street to MP 11.393 State Route 62
--Roadwork - US 10 in both directions
Bridge maintenance operations, single line traffic alternating directions, reduced to one lane, entrance ramp closed
on US 10 in both directions from MP 226.2878468 7th Ave -
--Roadwork - NB I-35W
Construction work, right lane closed, right shoulder closed, exit ramp closed
on NB I-35W from MP 6.2 N of Exit 5 - 106th Street to MP 6.5
--Roadwork - SR 62 in both directions
Road construction, left lane closed, left shoulder closed, reduced to one lane
on SR 62 in both directions from MP 106.679 Exit 106A -
--Roadwork - SB I-494
Road construction, right lane closed, width limit
on SB I-494 from MP 63.096 Exit 63B - US10 to MP 64.204 Exit 64A - Hardman Avenue
Roadwork - SR 77 in both directions
Road construction, reduced to one lane
on SR 77 in both directions from MP 10.467 East 66th Street to MP 11.393 State Route 62
since 7:00 PM, 10/20/08 until 12:15 AM, 10/31/08.

Lane Control Signals



IRIS Roadway Network Builder



Reasons for Sharing IRIS

- IRIS is reliable and well developed traffic management / traveler information software
- Other states have requested IRIS
- Increase number of software developers familiar with IRIS (lower risks)
- Share costs of ongoing developments and enhancements
- Speed development of new features
- Increased number of field devices supported
- Benefit from outside perspective and ideas on development

Software License Options Considered

- ***Proprietary:*** Circulation for use, but not for modifying/enhancing

- ***Public Domain*** No control over the future

- ***GPL:*** Liberties of open circulation (not price)
  - freedom to run
  - freedom to study
  - freedom to improve
  - freedom to redistribute

GPL Software License Selected

- ***GPL (General Public License)***
  - Not Public Domain
  - Copyrighted
  - Copylefted (preserves freedoms in all later releases)
  - Typically an ongoing act of verifying any changes

Open Source Software

- Source code is available to everyone
- Source code from all ‘derivative works’ also must be available to everyone
- Shared cooperative development of IRIS
- Build a community familiar with IRIS
- Zero licensing costs (initial or ongoing)
- Leverage development expertise from many agencies

Status of IRIS Sharing - Caltrans

- Caltrans contracted with the Advanced Highway Maintenance & Construction Technology (AHMCT) Research Center at the University of California, Davis, to evaluate the feasibility of implementing IRIS
- IRIS has been deployed in District 10. Continuing to expand to 3 other districts.

Status of IRIS Sharing – Other DOTs

- WisDOT
  - Contracted with Kimley-Horn to assess the feasibility of implementing IRIS for their statewide TMC in Milwaukee
  - Set up a test IRIS server for evaluation
- Wyoming DOT
  - Set up a test IRIS server for evaluation
- Other Interest
  - Illinois
  - Tennessee
  - Colorado

The Vision

- MnDOT has released IRIS as GPL
- MnDOT invites other agencies to implement IRIS and share in continued development
- Create an IRIS Group consisting of agencies implementing IRIS
  - Identify future features and lead agency for each feature
  - Develop mechanism for developers to ask questions, share ideas, etc.
  - The number of software programmers familiar with IRIS will significantly increase to the benefit of all

Current IRIS Resources

- http://iris.dot.state.mn.us
- http://www.selenic.com/mercurial
- http://iris.ahmct.ucdavis.edu
- http://ahmct.ucdavis.edu

Questions