

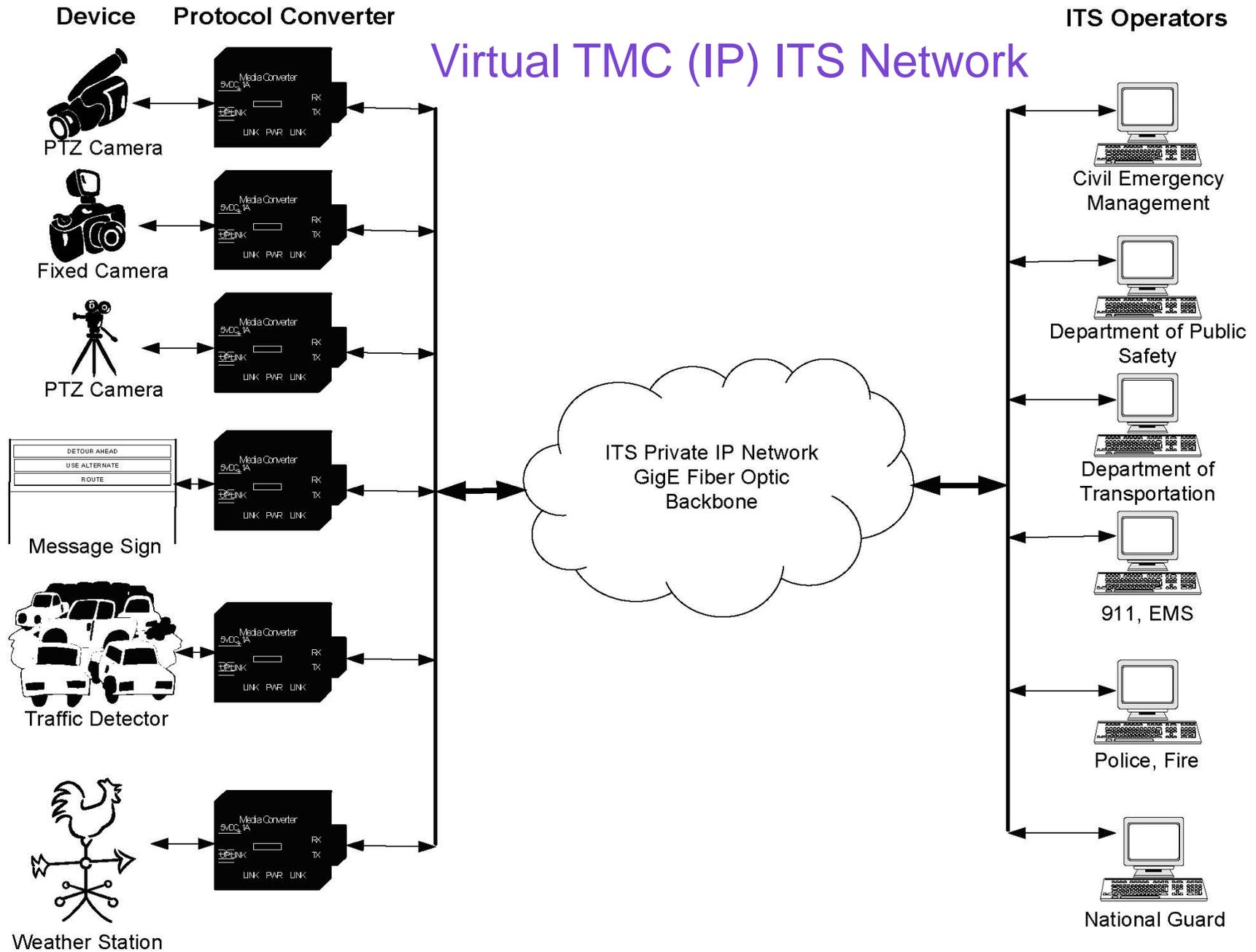


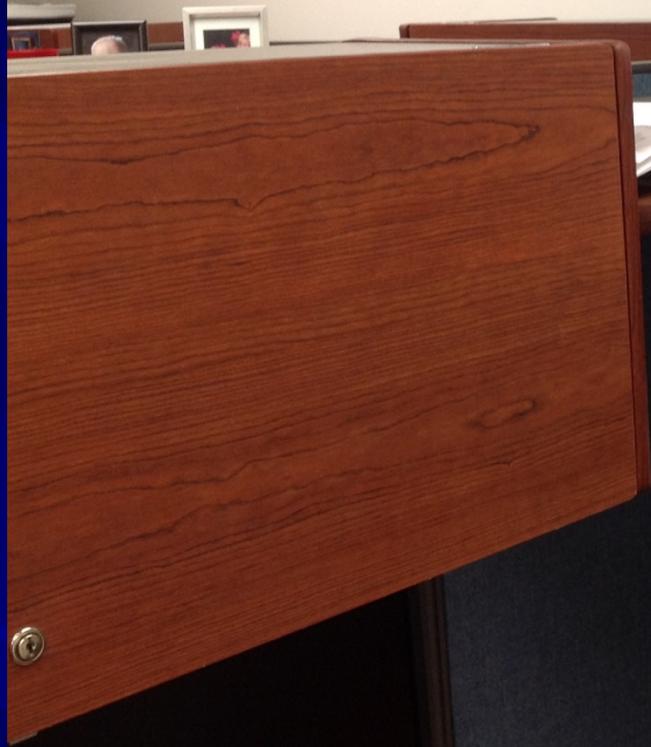
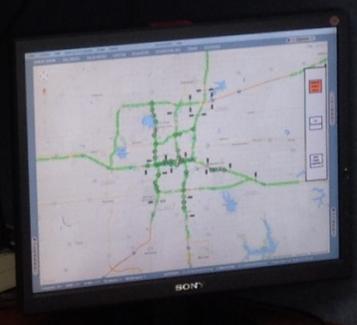
## A Low-Cost Virtual TMC Architecture for Intelligent Transportation System Deployment in the State of Oklahoma

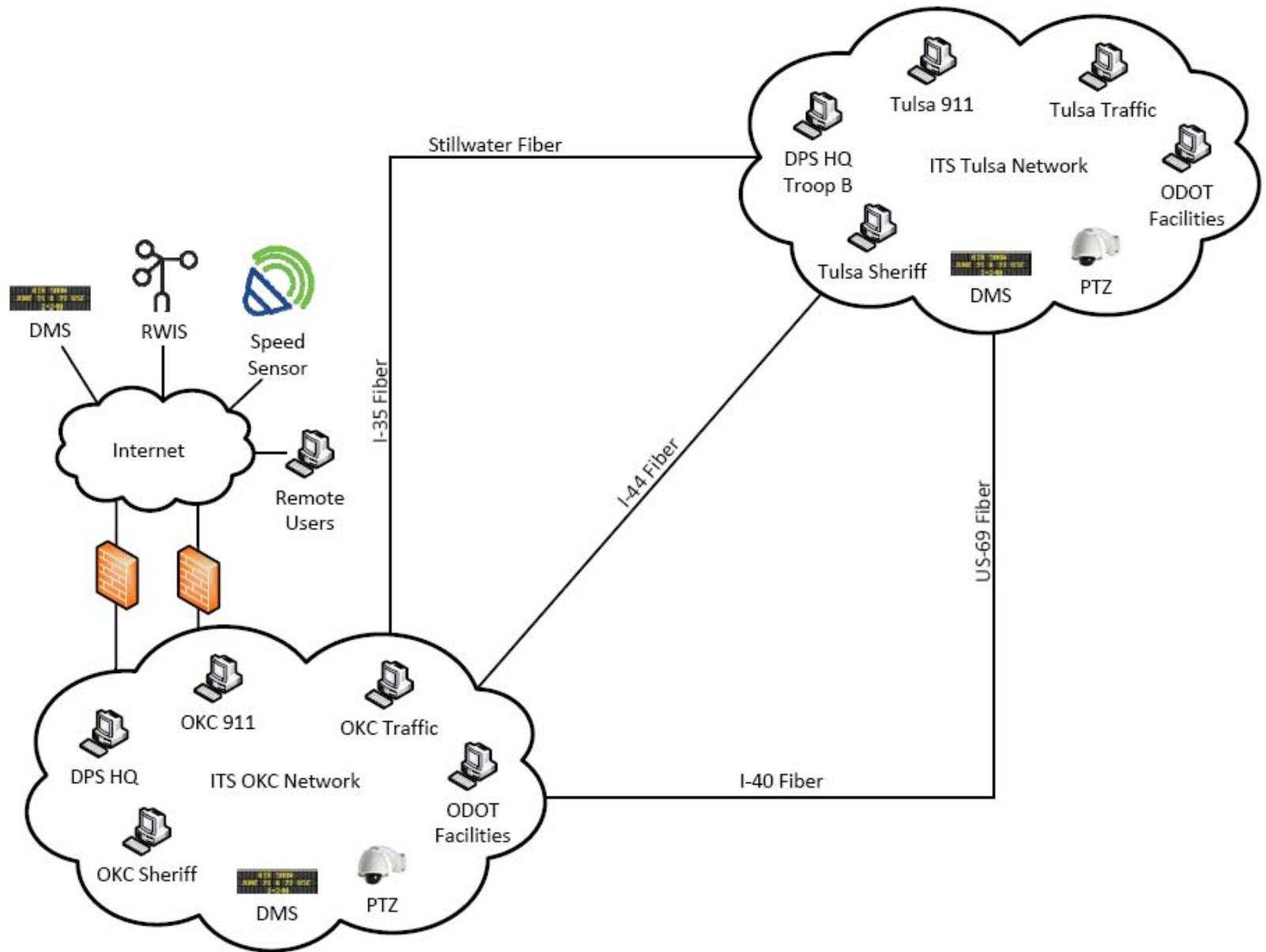
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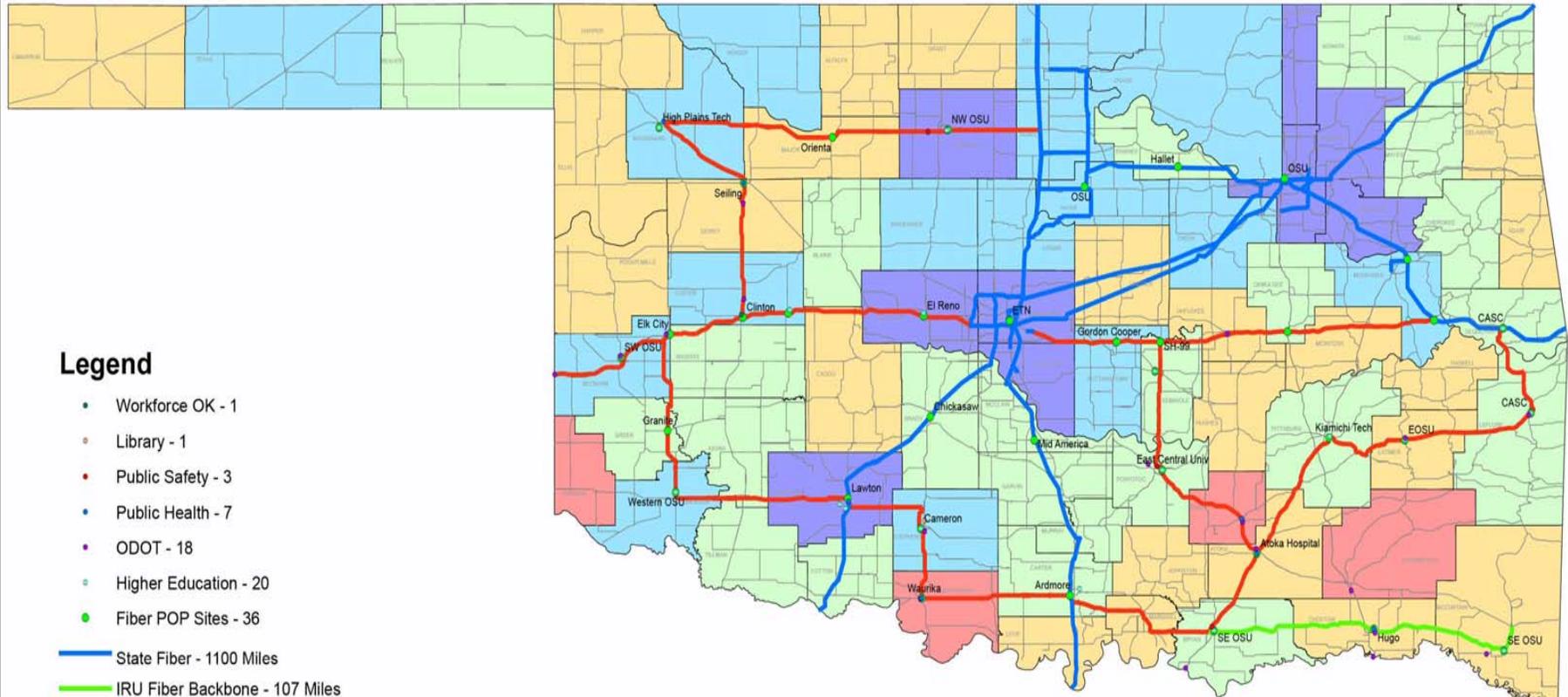
# Virtual TMC (IP) ITS Network







# State of Oklahoma Map - Broadband Proposal for Fiber Backbone with Anchor Facilities and POP Sites



## Legend

- Workforce OK - 1
- Library - 1
- Public Safety - 3
- Public Health - 7
- ODOT - 18
- Higher Education - 20
- Fiber POP Sites - 36

- State Fiber - 1100 Miles
- IRU Fiber Backbone - 107 Miles
- Proposed Fiber Backbone - 1005 Miles

## Counties

### CSMG Broadband Penetration Data

- 4 Counties (25% - 27%)
- 23 Counties (28% - 35%)
- 25 Counties (36% - 43%)
- 16 Counties (44% - 50%)
- 9 Counties (51% - 63%)

77% of Counties Touched by Broadband Proposal

89% of Population Touched by Broadband Proposal

# Virtual TMC Lessons Learned

- Decade of development / super-peer = coordinates updates & versions.
- Automatic Console Database Updates
- Multi-model hybrid communications complicates get back to backbone.
- Multi-Agency Coordination – Technology helps but still it is very difficult.
- Hardware breaks requires physical touching of remote ITS Consoles.
- New Users at remote sites, creates operational problems.

# Virtual TMC Control Concept

- The cost of building, staffing, and operating a large, centralized monolithic TMC was deemed *too expensive* for Oklahoma.
- We have dramatically reduced the cost by designing a peer-to-peer network of low-cost “ITS Consoles”
  - Low-cost off the shelf hardware.
  - Distributed control of ITS system resources.
  - Fault tolerant.
  - Can be deployed with appropriate agencies/individuals across the entire state.
  - Effectively implements a “virtual TMC” without sacrificing the benefits of a centralized facility.

# User Perspective

- Authorized users: state and municipal engineers, ITS operators, transportation managers, city planners, emergency managers, civil defense, etc.
- Each user has a profile that defines their priorities, privileges, and capabilities.
  - these are maintained any time the user logs in to *any* ITS console in the state.
  - including remote logins from home or mobile radio (VPN – virtual private network)



**The  
End !**