

## **Information Technology Services Division (ITSD)**

HB14 – Appropriations for IT Projects  
PL 712 – Network Expansion

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### **Presentation Topics**

- Scope clarification
- Network Challenges
  - Network growth
  - Performance degradation
  - New network demands
- Proposed Solution
  - Architecture
  - 2 Part solution
- High-Level Project Plan



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## How State Government Data Network Expansion Differs From E9-1-1 and Interoperability Montana

### E9-1-1

Getting the 9-1-1  
Emergency Call from  
the Public to Responders



### Interoperability Montana (IM) Project

Wireless (radio)  
Communications for  
Responders in the Field



**State Government  
Data Network  
Expansion**  
Increasing the  
capacity of State  
government's data  
network



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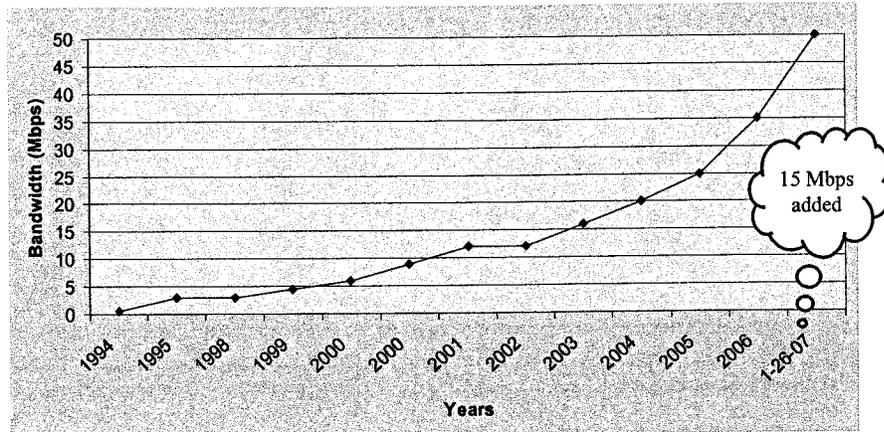
# Network Challenges



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## Network Growth Challenge— Internet Bandwidth Demand



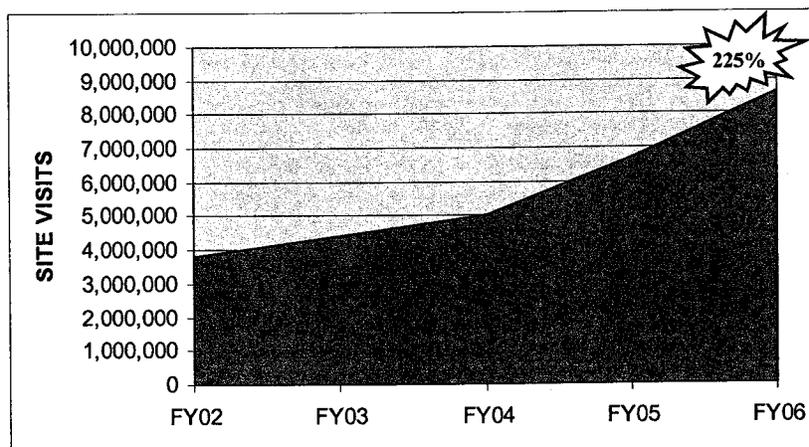
Current Utilization is 90+%



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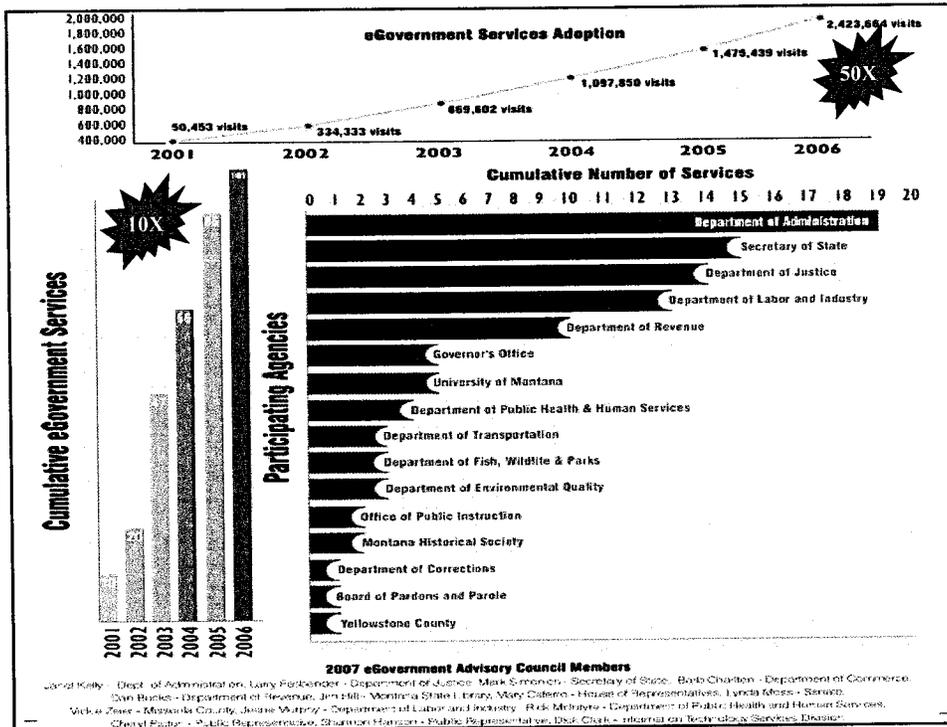


## Growth in Visits to State Website



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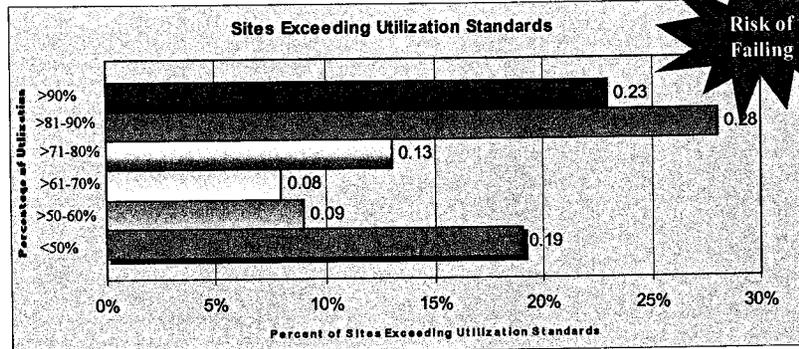


## Current Network Performance & Utilization Impact

Performance Category	Utilization Percentage	Percent of Network Sites	User Impact
<b>Poor</b> Routine Packet loss exceeding 2% resulting in significant transmission of packets.	≥80%	51%	<b>Significant</b> IP Voice/Video will not work 
<b>Marginal</b> Occasional packet loss (< 2%) resulting in retransmission of packets, significant packet delay (120 to 180ms).	61 to 80%	21%	<b>Minimal</b> IP voice/video is questionable. 
<b>Good</b> There are no lost packets, and minimal packet delay(≤ 120ms).	0 to 60%	28%	<b>None</b> 

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## Remote Site Bandwidth Utilization



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## Challenge – New Demands on the Network

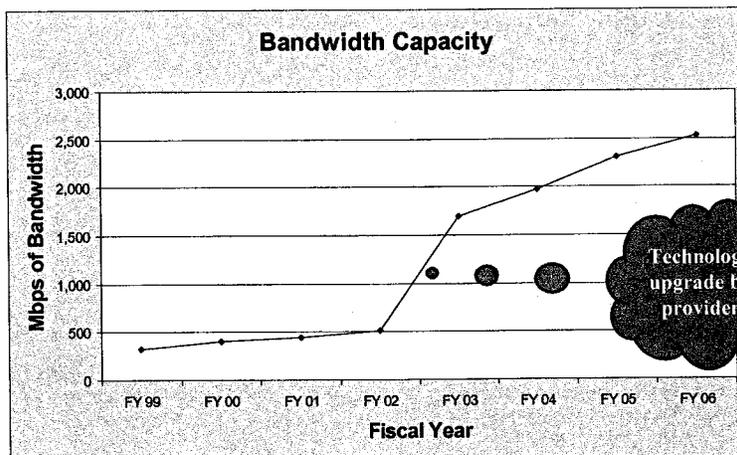
- “Converged” network
  - Data and video ... and possibly voice
  - Requires end-to-end service management
- Potential for greatly expanded education connectivity
  - Expect heavy demand for video (distance learning)
- Local Government
  - Statewide applications (MT Votes, PVAS, etc.)
  - Specialized services (GIS, Imaging, etc.)
    - Heavy bandwidth applications



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## Network Challenge— Limited Ability to Fund Capacity



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## Summary of Current Network Issues

- The demand for services trend is accelerating
- Our capacity upgrade capabilities have not been able to match the increase in demand
- Majority of our site connections are over-utilized
- Current statewide network technology is outdated and can't support future capacity requirements for integration of video/voice



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## **Conclusion:**

Montana needs:

1. Greater capacity, that's flexible and cost effective
2. Appropriate technologies to support application and capacity needs
3. To extend the cooperative approach across State government, education and local units of government
4. To continue our successful relationships with private sector providers



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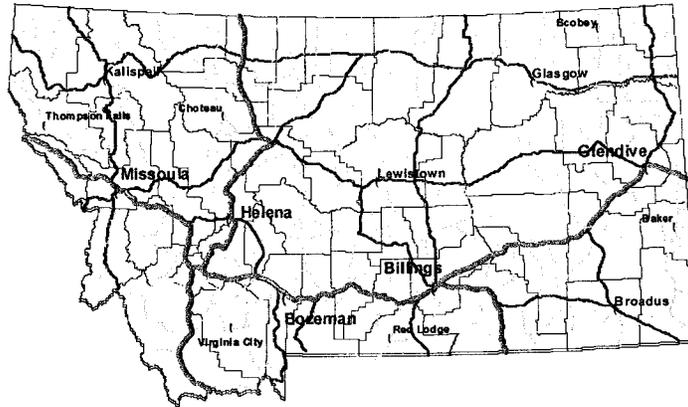
# **Proposed Solution**



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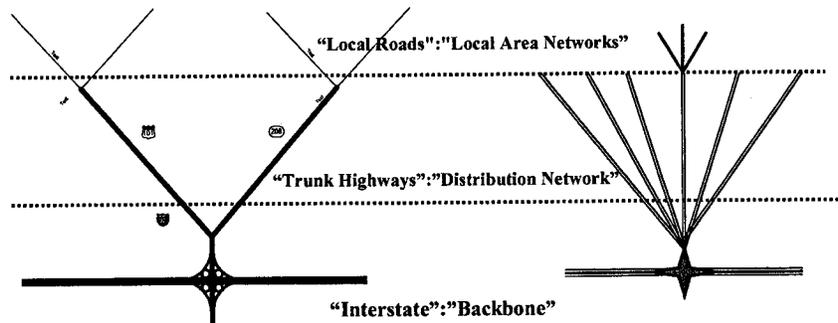
## The Transportation Analogy



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## Network Architecture Layers

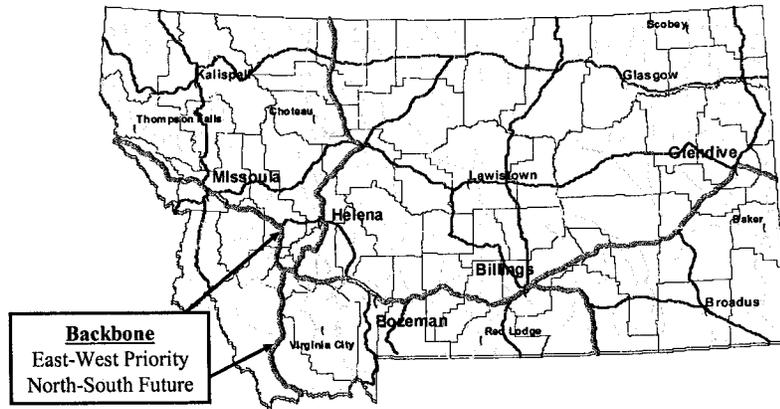


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# Network

## The Transportation Analogy



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## Provider Architecture

- Backbone ("Interstate")
  - Leased Service
- Distribution ("Secondary Roads")
  - Leased Service
- LAN ("Local Streets")
  - Customer owned

Currently  
18 Providers  
(\$4.1 MM)

The State has **no intention** of owning the Backbone or Distribution layers.

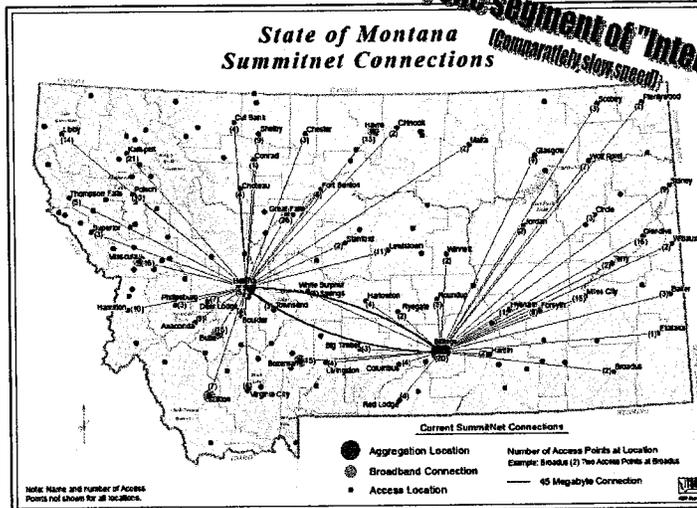


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## Current Network Design

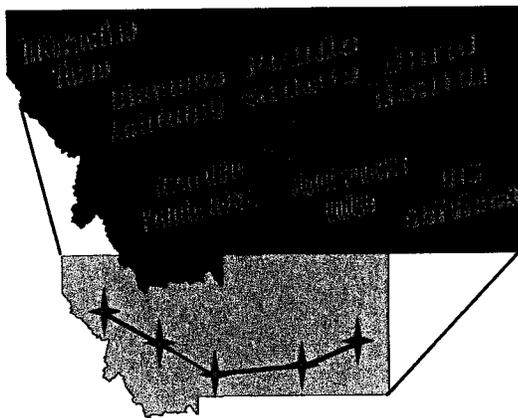
*Only one segment of "Interstate"!  
(Comparatively slow speed)*



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## Network's Value is in the Applications & Services



– Applications provide the value to the State and the citizens.

– Network infrastructure essential to delivering the existing and new applications and services



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## **Solution (Part 1): High Speed Backbone**

**Building the  
"Interstate"**

- Cost: \$4,569,530
- Optical network across the state
  - "Superhighway with 5 on/off ramps"
  - State-of-the-art technology
  - High capacity, expandable to meet future needs
  - "Low cost" allowing greater portion of dollars to be spent on local connectivity
- Internet connection
  - Upgrade bandwidth at Helena and Eastern Montana Service Centers.
  - Supports redundancy and load balancing between Internet portals.



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## **Solution (Part 1): High Speed Backbone**

**Building the  
"Interstate"**

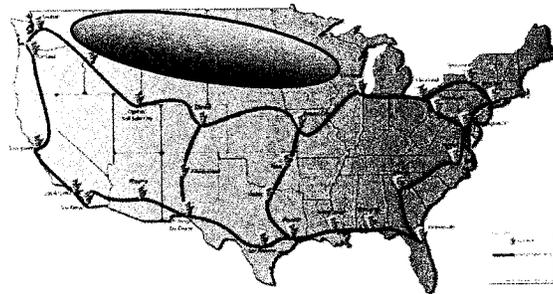
- Benefits:
  - Improved performance and services for state and university network traffic
    - Missoula, Helena, Bozeman, Billings and Glendive on/off ramps.
  - Connects to regional and national research and education networks.
  - Designed to provide future connectivity of K-12, research institutions and economic development initiatives
  - Agency business applications require high availability and throughput.
    - E-Gov Services



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## The USA Northern Tier - Motivation



Regional Networks Built in Several Areas

**If this was 1870**

We'd be looking at the map trying to assure that railroad lines go into and across Montana  
 Recall what the Great Northern and Northern Pacific did for the Montana economy

**If this was 1955**

We'd be looking at the map trying to assure that the interstate highway system goes into and across Montana  
 Recall what the interstate highways did for Montana's economy

**But because this is 2007**

We're looking at the map trying to assure that *next generation networking* goes into and across Montana  
 Imagine what high-speed communications will do for Montana's economy!

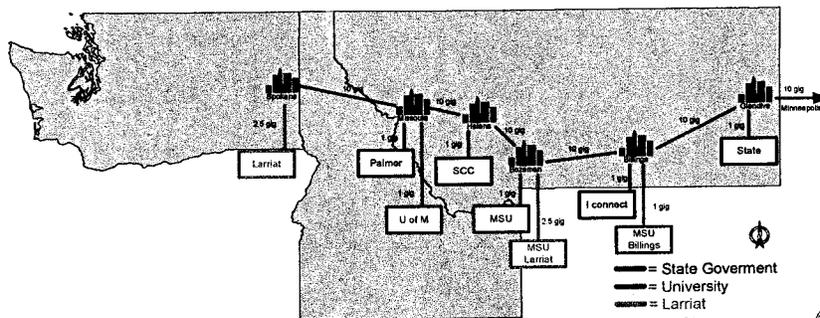


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## Montana's Optical Network (MontNET)

Usage arrangement for private sector provider fiber already in the ground.  
*No New Fiber – Not State Owned!*



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## For the Record

- Rumored concern that the State would sell excess backbone capacity.
- Network capacity cannot be sold to other customers in competition with providers
  1. Policy of this Administration to respect the rights of providers
  2. Constrained by right-to-use agreement
    - Education/research/gov't. (ATT antitrust settlement)
  3. Prohibited by statute (2-17-601 et seq, MCA)
- **Montana's telecommunications providers need not be concerned about the State taking any actions in competition with their business interests**

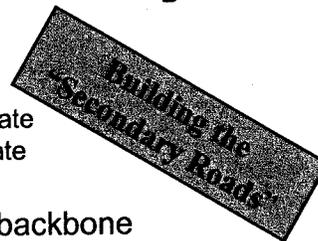


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## Solution (Part 2): Enhancing the Distribution Layer

- Cost: \$3,253,470
- Remote Office Upgrades
  - 145 communities throughout the state
  - 460+ office sites throughout the state
- Redundant core switches
- Upgrade Capitol Complex fiber backbone
- Supports Agency Business Requirements
  - Upgrade ~80 sites operating at 56K (home dial up speed)
    - Experiencing significant performance impacts.
  - Expanding use of network to support administrative & agency business applications
  - Centralized backup of remote servers and devices.
  - Need to support Video and Data



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# High-Level Project Plan



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## The Approach

- Combined the Network Expansion EPP and the MontNET backbone initiative into one proposal.
  - \$7.8 million OTO
- The current contract for Qwest transport services has been extended to Dec. 2007
- RFP issued Dec. 15, 2006 for vendor response and evaluation in parallel with funding process.
  - Distribution layer pricing
  - Vendors were asked to bid a primary and redundant backbone route.
    - If Northern Tier Network Consortium is used, vendor would provide the diverse, redundant route part of backbone.



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## Expected Timing for Statewide Network Backbone

- Network Contract Expiration 12/01/07
- Projected Schedule
  - RFP Release 12/15/06
  - Contract Signing 7/25/07
  - Aggregation Sites Activation 10/15/07
  - Remote Office Migration 11/30/07
- MontNET backbone 12/31/07



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## Distribution Layer Priority Upgrades

49 Communities; 94 sites

Anaconda	Colstrip	Glendive	Livingston 2	Scobey
Belgrade	Columbus	Great Falls 4	Miles City 3	Shelby
Billings 4	Condon	Greenough	Missoula 2	Stevensville
Bozeman	Conrad 2	Hamilton	Pablo 2	Sunburst
Browning	Crow Agency 2	Havre 6	Philipsburg	Superior
Butte 4	Deer Lodge 3	Helena 9	Polson	Thom. Falls 2
Chester	Dillon 4	Lame Deer 2	Poplar	Three Forks
Choteau	Ft Benton 3	Lewistown 3	Red Lodge	Va. City
Circle	Glasgow 3	Libby	Roundup 2	W. Glacier
W Yell'ne	Wh Sulphur	Whitefish	Wolf Point 3	



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## Topics Covered

- Challenges
  - Network growth
  - Performance degradation
  - New network demands
- Proposed Solution
  - Architecture review
  - High speed backbone & Internet access upgrades
  - Enhanced distribution network
- Project Plan
  - RFP in parallel to funding process
  - Expected timing



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# Questions?



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