

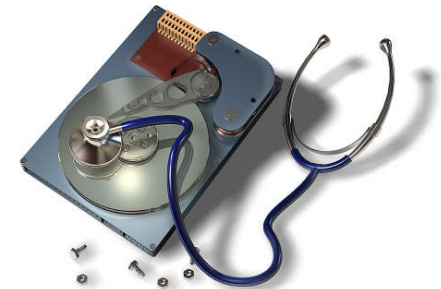


# Using Networks to Save Patient Lives

23 October, 2008

# Using Networks to Save Lives

- Healthcare network landscape
- Drivers for a modernized network
  - Case studies
- Benefits to providers and patients
- Requirements of the modernized network
- Ciena's vision for healthcare networks



# Technology's role in Healthcare

## Technology in healthcare must:

- combine clinical process improvements with a culture of safety
- improve patient safety while allowing patients involvement
- displace outdated infrastructures to enable competition with other providers and deliver highest patient care
- securely share and deliver timely information with providers
- ensure compliance with government regulations

# What networking challenges do our healthcare customers face?

- Inconsistency and difficulty planning bandwidth and network demands
- Increased management and maintenance costs
- Lack of service flexibility
- High latency jeopardizing application performance

# Patient data back-up and disk mirror

## Business problems

- Increase in EMR and EHR are driving exponential storage traffic
- Compliance requirements are driving the need for flawless storage solutions
- High availability and reliability are necessities; not simply “nice to have”
- Bandwidth demand growth is unpredictable
- Provisioning times for new services and bandwidth are long and cumbersome

**Technology saves lives!**

Mortality rates are 7.2 % lower  
in the “most wired” hospitals

*Source :Hospitals and Health Networks magazine  
(H&HN) 2005 Study*



# Applications Driving Bandwidth and Storage Data

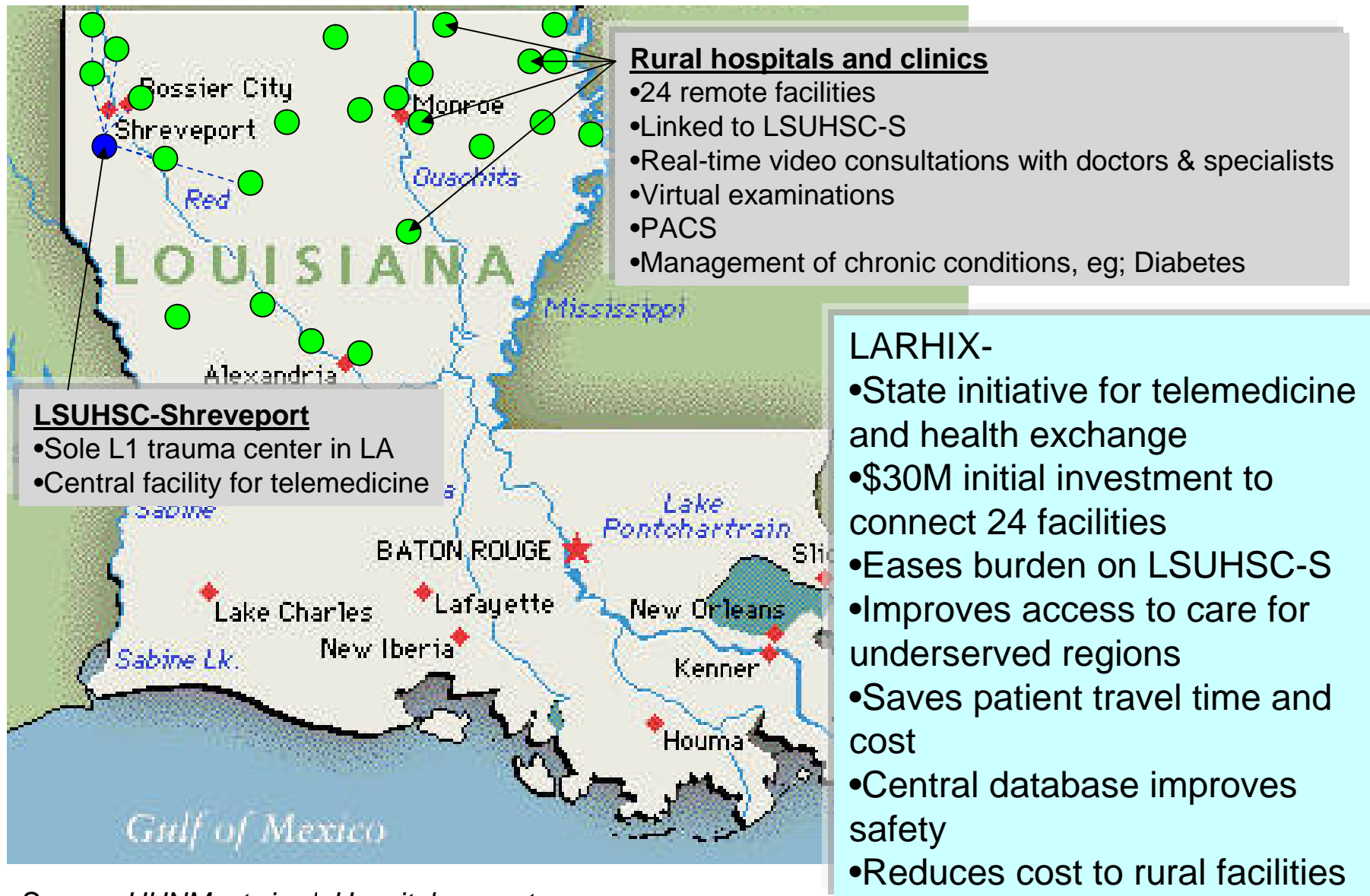
Picture Archiving and Storage (PACS) /  
Mammography example:

- Patient population of 10,000 women ~ **12 Tb** of data
  - 75 Mb digital images
  - 4 images per scan → 500 Mb moving to 1 Gb
  - Typical screening centers scan 100 patients per day
    - **Database grows 30 - 100 Gb per day**
  - Average of 16 images per patient → 1.2 Gb of data (16 \* 75 Mb)
    - Average woman will be having her fourth scan
    - 3 previous screening sessions' data
- Physician needs to see single 16-image patient record within 30 seconds
  - **~20 Gbps** for remote physician screening

## Applications

- **EMR / EHR**
- **Patient Tracking and management**
- **Asset Tracking and management**
- **Tele – Presence / Remote Video**
- **Remote Diagnosis**
- **BC / DR**
- **High Availability**

## Case study: Louisiana Rural Health Information Exchange (LARHIX)



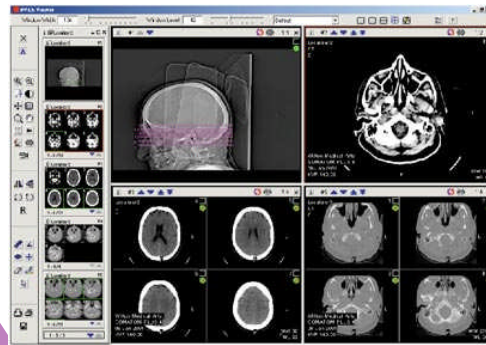
Source: HHNMostwired, Hospitalconnect.com



# PACS & stroke mortality

## UC San Diego study of stroke treatment-

- Four remote sites, 222 random patients diagnosed through either telemedicine or phone consult
- Broadband voice and video connection used to assess treatment
- Correct diagnosis 98% when examination included video
- Correct diagnosis dropped to 82% when consult was voice-only



Network advances allow remote radiological readings

- CT, PET, MRI
- Echocardiography, ultrasound
- Rapid diagnosis of stroke
- Rapid treatment

**Remote access to PACS enables rapid diagnosis**  
➤ **treatment within 3 hours of onset can reduce mortality by 40%**

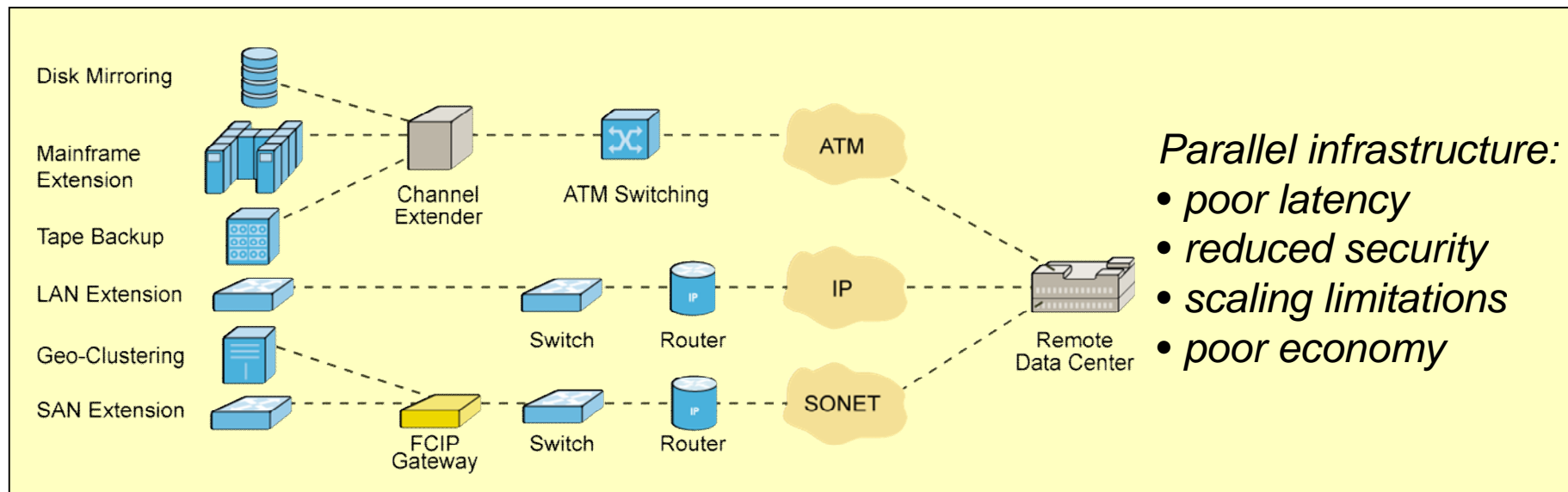
Sources: *iHealthBeat, North County Times, MedicEd.com*

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# Healthcare Network Applications

*...and their needs from the network*

Web Applications		Remote Storage		Imaging	
Distributed object oriented programs	<i>Predictable, low latency</i>	CoOP, BC/DR	<i>Reliable, secure, wide bandwidth</i>	Distributed Processors	<i>Low latency, wide bandwidth</i>



# Requirements of the modernized network

## Cost

- Must meet Budget Constraints
- Often bandwidth make up >70% of the project cost

## Performance

- Minimal Impact on the Application with a High Throughput, Low Latency, and Rapid Restore Times

## Sustainability and Future-proofing

- Intelligent utilization of network
- Flexible support for all applications and data types (Storage, Voice, Data, Video)
- Low management and maintenance cost over time

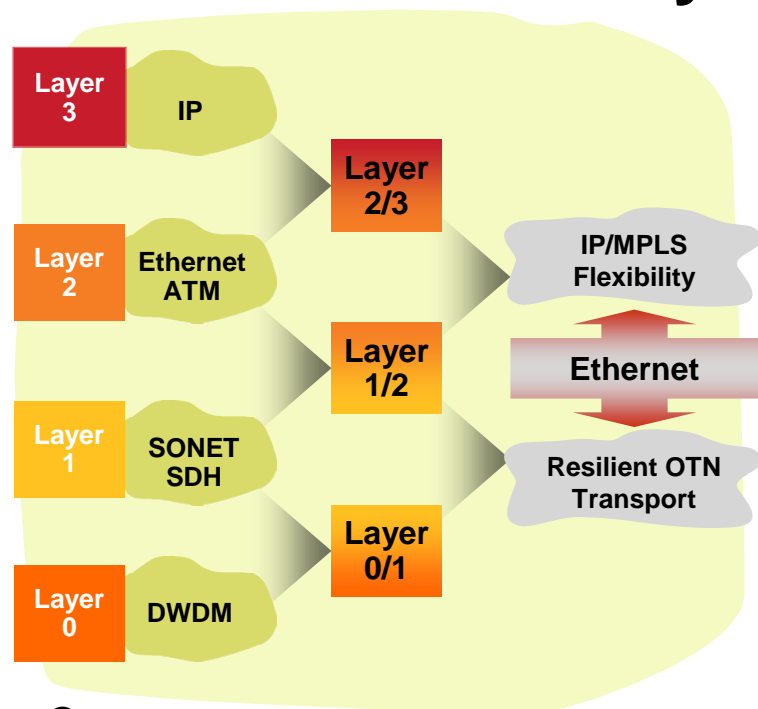
## High Availability and Security

- Five 9's, with the Ability to Monitor/Report/Protect to Maximize Performance and Perform Rapid Fault Isolation
- Guaranteed Isolation of Sensitive Data
- Guaranteed Data Delivery



## **Ciena's Vision for the Healthcare Network**

# Ethernet is the key to convergence



## Why is Ethernet so powerful?

- Multiservice flexibility
- Universal and familiar
- Transport-grade connectivity

### Cause

International standardization

Unrivalled success in enterprise

Multiple equipment manufacturers

Mature, layer 2 technology

### Effect

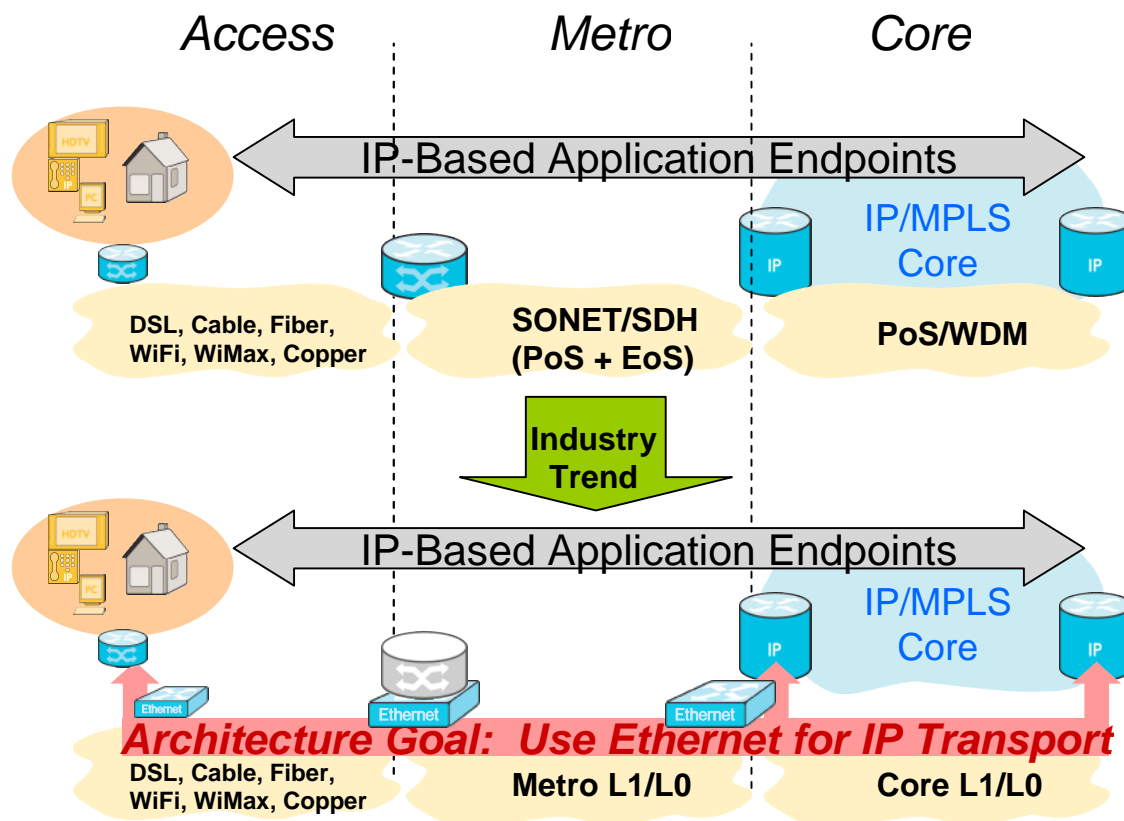
First global network access technology

Access, metro, and wide-area applications

Lowest cost per megabit: ~7¢ per megabit for triple-speed NIC

Plug-and-play deployment

# Ethernet as multi-service transport



## Ethernet as Transport:

- Ethernet forwarding/aggregation between the application endpoints
- Leverage the economics of Ethernet for packet transport
- Common transport technology across all tiers
- Scalable and granular
- Reduce the routing layer, reduce cost
- Improve service visualization in the transport layer; packet transport for packet services

# Ethernet-based service transport requirements

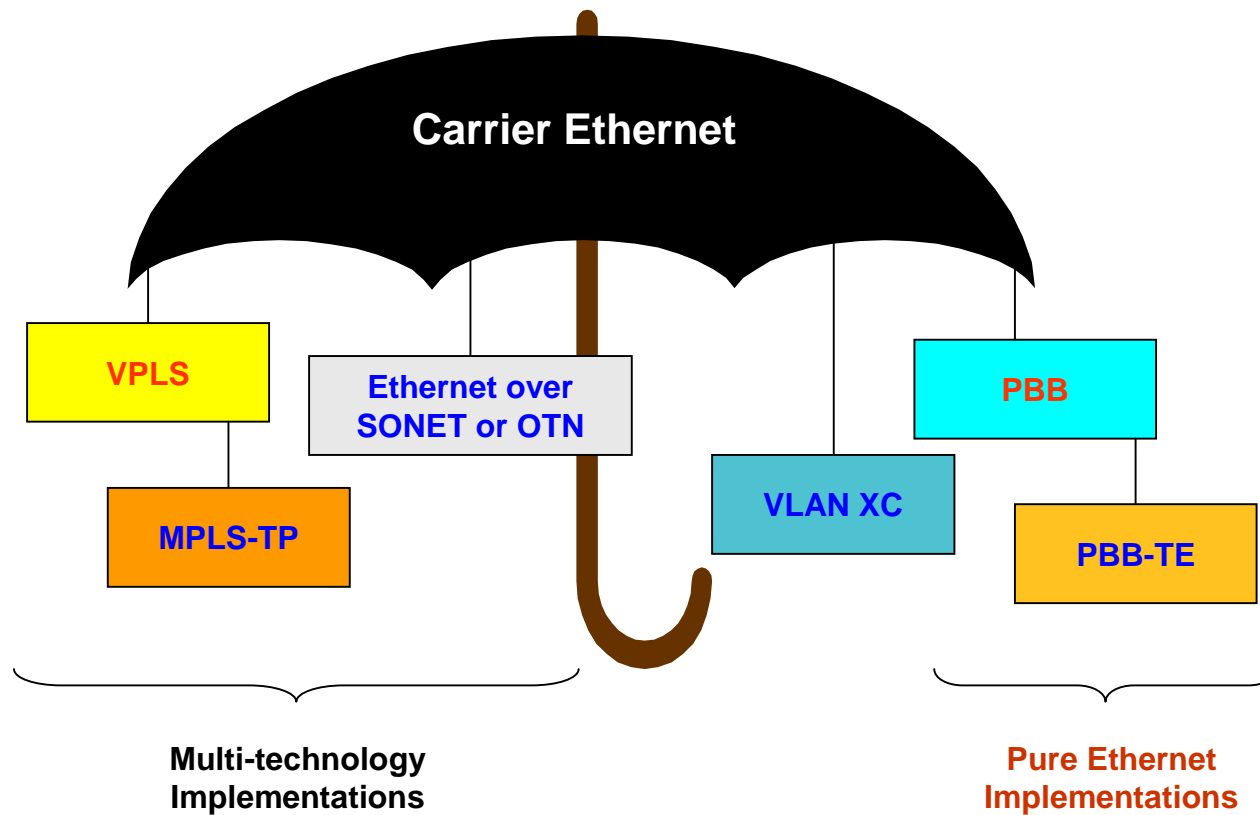
Critical Aspects	Business Services
Services Portfolio Evolution	L1, L2, L3 (v)pns to Managed Services, BC/DR, hosting, web services, etc.
Service Topology	<b>Pt-Pt:</b> Yes <b>Pt-Mpt:</b> Yes <b>Mpt:</b> Yes
Transparency	Yes. L1 vs L2 vs L3 (V)PNs
Scalability	100+ endpoints per VPN 1000+ of customers
QoS	Multiple CoS per customer with strict priority queuing SLA
Security	access control
Reliability	50ms protection, 5-nines

**Need multiple connectivity options with “TE” capable transport**

TE: Traffic Engineering

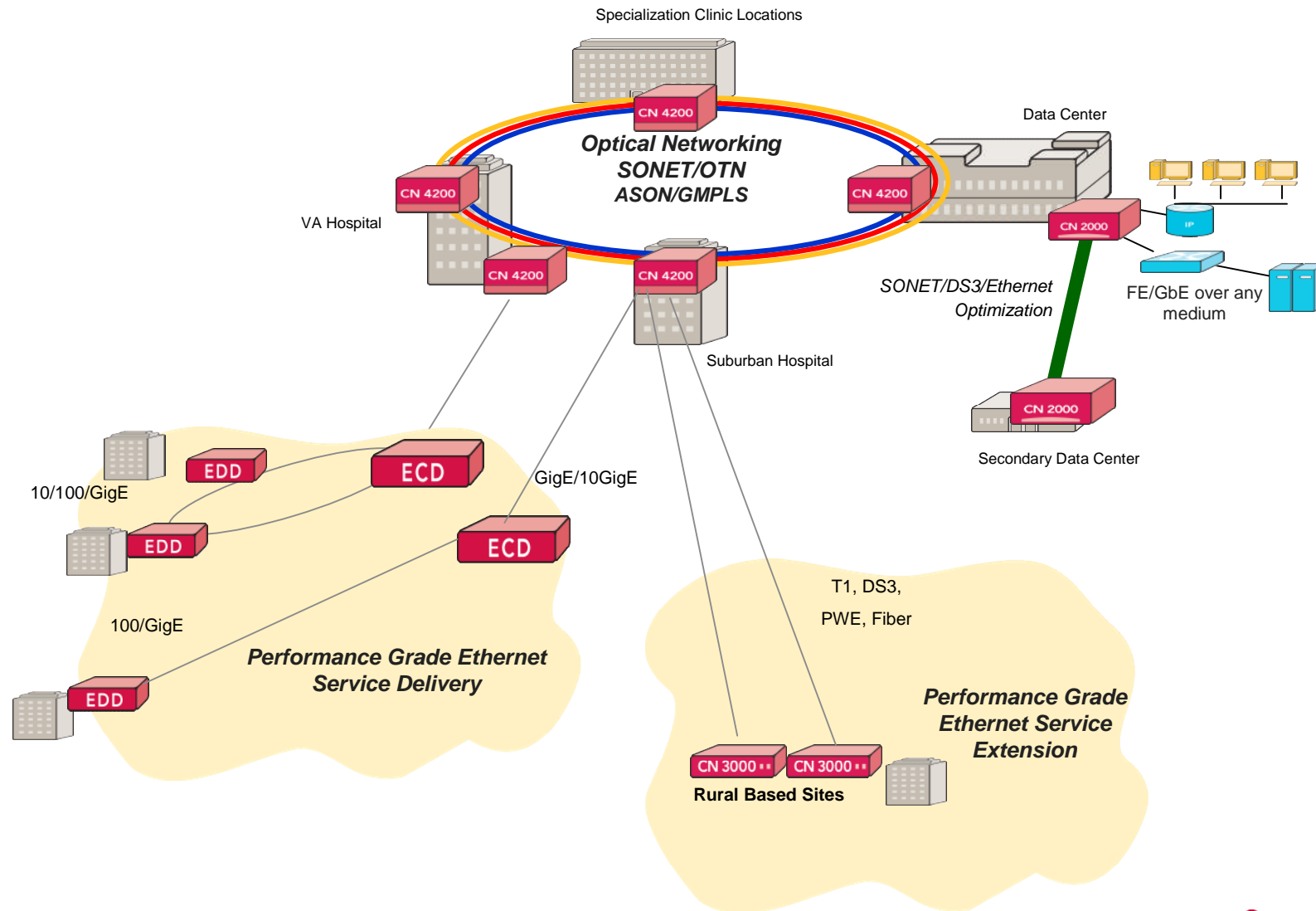
# Ethernet traffic engineering methods

- Routing: forward IP packets
- Bridging: forward Ethernet frames
- Transport: switch Ethernet frames

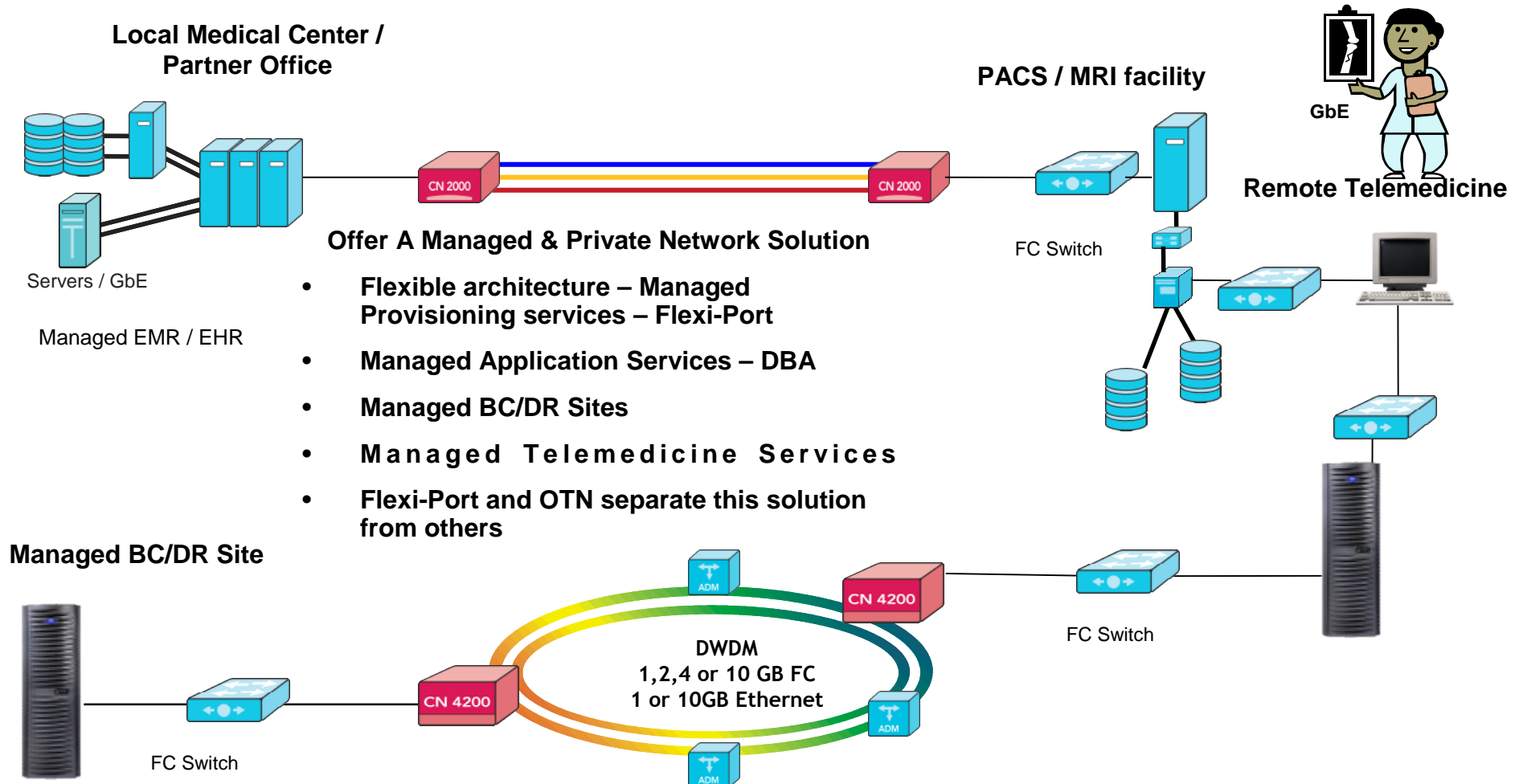




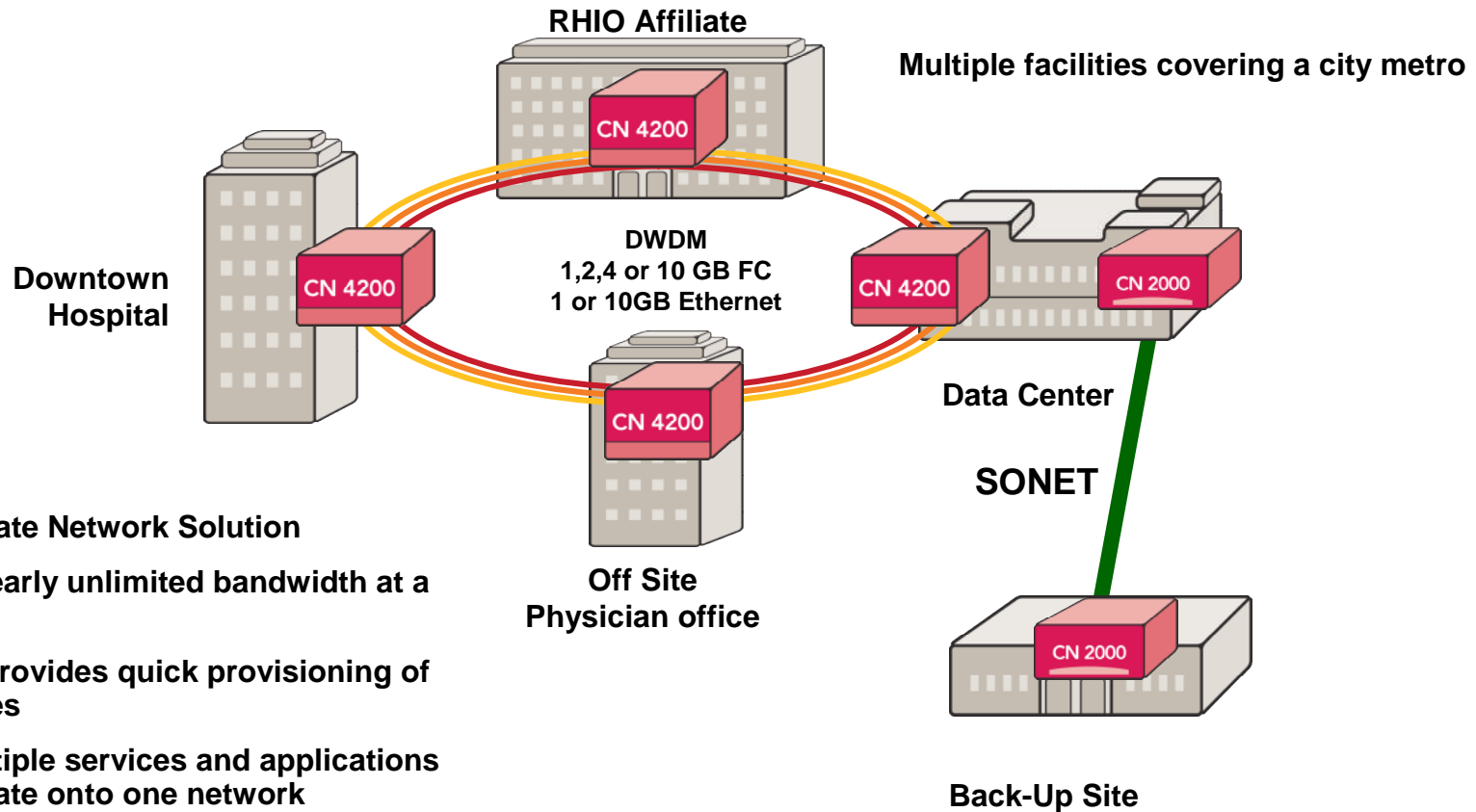
# Notional architecture for healthcare connectivity



# Application Example: Managed high-speed Picture Archiving and Communications Solutions (PACS)



# Application Example: Intra-City Regional Health Information Organization (RHIO) Networking



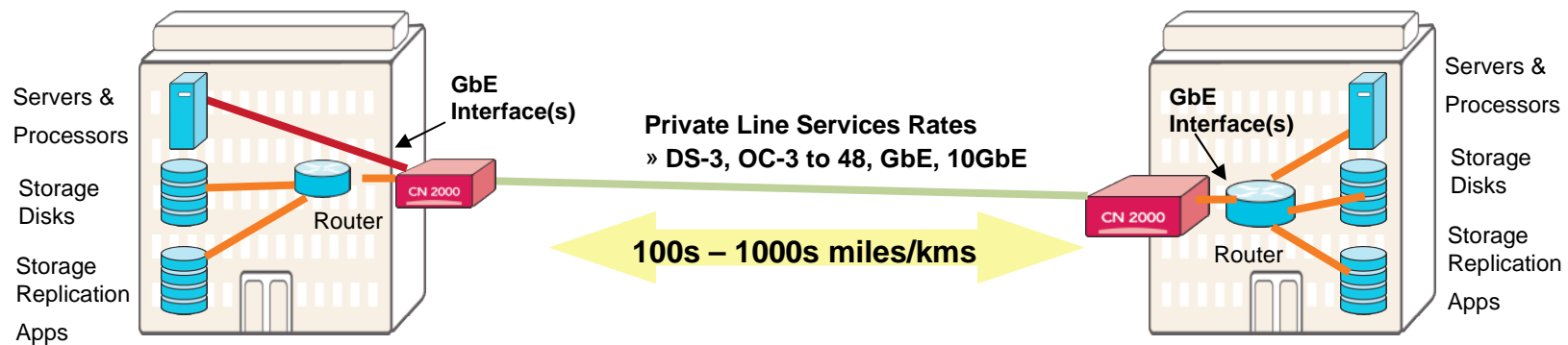
## A Private Network Solution

- Provides nearly unlimited bandwidth at a fixed price
- Flexibility provides quick provisioning of new services
- Allows multiple services and applications to consolidate onto one network
- Lowers management and maintenance costs associated with a multiple network solution

*RHIO= Regional Health Information Organization*

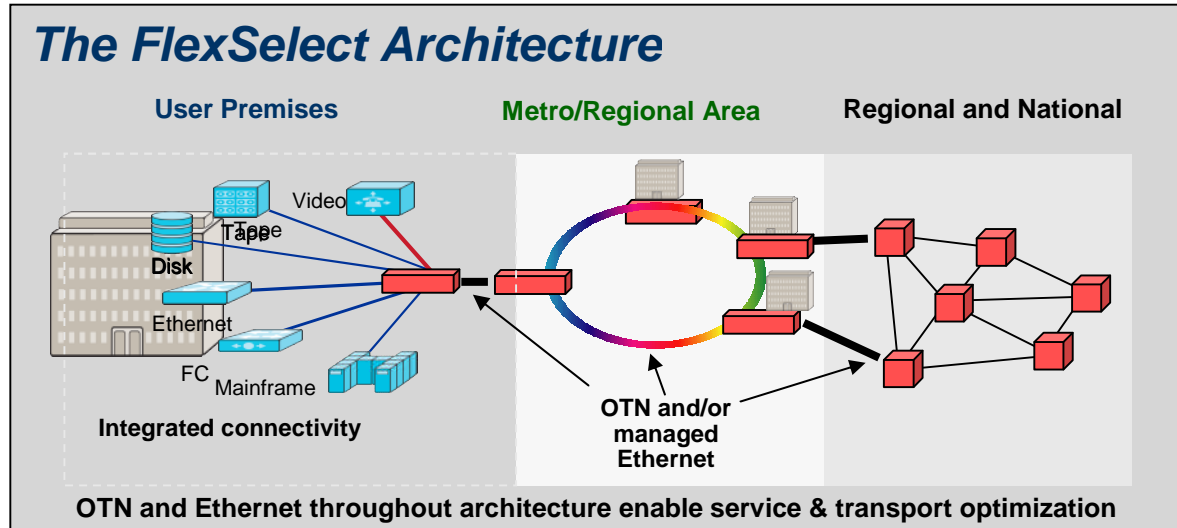
# Application example: Private line or dedicated Ethernet access

## RURAL HEALTH CARE INSTITUTION

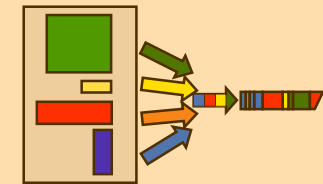


- Provides GbE interface on SONET access links
- High bandwidth with high performance via compression
  - E.g.: With 4:1 Compression, attain OC-12 effective service rate over OC-3 access service
  - Payback in 6 to 12 months.
- Saves on router interfaces by enabling low cost GbE interfaces vs. Packet over SONET interfaces (approx. 50% savings)

# Ciena's Assured, Adaptive Network



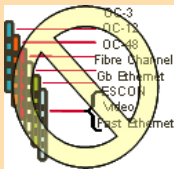
## Carrier Grade Ethernet



Integrated Ethernet Switching  
saves in L2  
switching cost, mgmt and  
maintenance

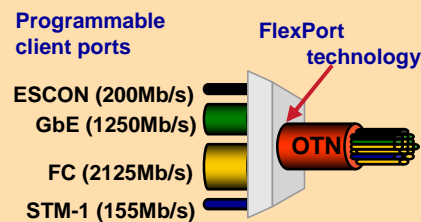
## FlexSelect Building Blocks

### FlexiPort



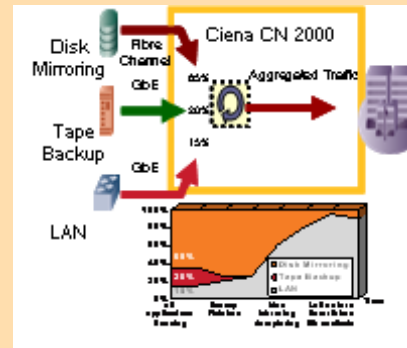
Programmability brings  
unprecedented flexibility

### OTN



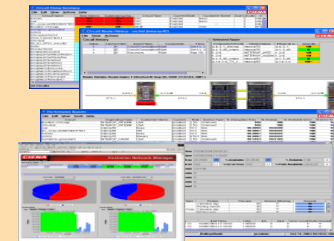
G.709 OTN brings  
highest efficiency and performance  
assurance

### Compression



Bandwidth optimization via  
compression and dynamic  
bandwidth assignment

### Automation



Universal management  
with automation and  
protocol layer visibility

# Summary

- Healthcare provider's networks improve patient's care and prognosis
- Evolving the Healthcare network is essential:
  - benefits to patients
  - keeps the institution competitive and relevant
  - lowers operating costs
- Converged networks are the best means to accomplish this evolution
- Bandwidth flexibility and adaptability
  - Delivered through performance grade Ethernet



:the network specialist for healthcare networks



# Questions???

**:the network specialist for healthcare networks**

→ **Specialty**: Practical innovation for creating software-defined, service-selectable networks for adaptable, assured networking

→ **Key offerings**:

- Optical, data and access networking platforms
- Network and service management systems
- Global network services and professional services

→ **Foundation for critical networks worldwide**

- Two-thirds of the world's 25 largest service providers
- Global 2000 enterprises and critical industry
- Federal, state and local government agencies

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