California Telehealth Resource Center

Presents:

Telemedicine Technology
Key Information for a Successful
Program

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Uh Oh, Tech Talk Coming

- Please turn **<u>on</u>** your cell phone ringers as this will help keep the audience awake…

- To assist you in staying awake, I will call on you for answers so you better pay attention... Really, I will…

Experience in Telemedicine

- **17 years with the University of CA, Davis**

  - Director of Technology
    - Managed
      - Technical Team
      - Distance Education Team
    - Seen over 11 thousand patients in 35 specialties
    - Setup Telemedicine Programs
      - Urban and rural hospitals and clinics
      - PICU, NICU, OR, ER, County Jails, Prisons, Parole offices
    - Designed Telemedicine Systems
      - 2 Patents on Telemedicine Systems
      - POTS to Satellite Communications

  - Director of the Telemedicine Learning Center
    - Trained over 800 Clinicians on how to develop their own telemedicine program
    - Developed classroom design & course curriculum

Experience in Telemedicine

- **Intel Corporation**
  - **Senior Management / Engineer**
    - In charge of Telemedicine efforts worldwide
    - Designed and deployed Telemedicine programs with World Ahead
    - Engineer on Telemedicine medical devices

Intel Receives FDA Market Clearance on In-Home Medical Device for Management of Health Conditions

The Intel® Health Guide Connects Patients and Their Care Teams for Personalized Care Management at Home

SANTA CLARA, Calif., July 10, 2008 – Intel Corporation today announced the receipt of 510(k) market clearance from the U.S. Food and Drug Administration (FDA) on Intel's personal health system, the Intel® Health Guide, a care management tool for healthcare professionals who manage patients with chronic

Intel® Health Guide

Click on the image to

Welcome to Telemedicine.com

We are worldwide Telemedicine experts, with over 20 years' experience in every aspect and phase of conceiving, creating, sales, installing, training and supporting Telemedicine projects throughout the globe. We can provide you a total Telemedicine solution, hourly Telemedicine consulting, or assistance at any phase of your Telemedicine project. To learn more about us, click here.

Contact us! mail@telemedicine.com or 530.676.0421

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Status:
Telemedicine connects big-city specialists and...

Click Here for Telemedicine Job Opportunities

Looking for a physician that specializes in Telemedicine? Check out our Worldwide Telemedicine Directory!

TELEMEDICINE.COM NEWS

October 2012

Telemedicine.com CEO Meets with the FCC Chairman!

Last month FCC Chairman, Julius Genachowski, visited with Telemedicine.com CEO, Daniel Kurywchak, and members of the California Telehealth Network at Barton Health in South

DEVELOPMENTS IN TELEMEDICINE

Medical professionals need technology: Ability to cross state lines vital. *Concord Monitor*. Yet the use of telemedicine is handicapped. Doctors are prohibited from treating patients across state lines unless they are licensed in both states.

Harnessing the black hole of health device data. *SmartPlanet*. Most health monitoring can be done automatically by smart electronic systems that understand a patient's overall condition

Experience in Telemedicine

- **Telemedicine.com, Inc.**
  - Telemedicine Systems and Medical Peripheral Sales
  - Telemedicine Installation and Training of Physicians and Technical Staff
  - Telemedicine Custom System Development
  - Telemedicine Support
  - Developed Hundreds of Telemedicine Programs Worldwide
  - Worldwide Telemedicine Deployments:
    - USA
    - Brazil
    - China
    - India
    - Lebanon
    - Nigeria
    - South Africa
    - South Korea

Goals of this Webinar

- Demystify Telemedicine Technologies
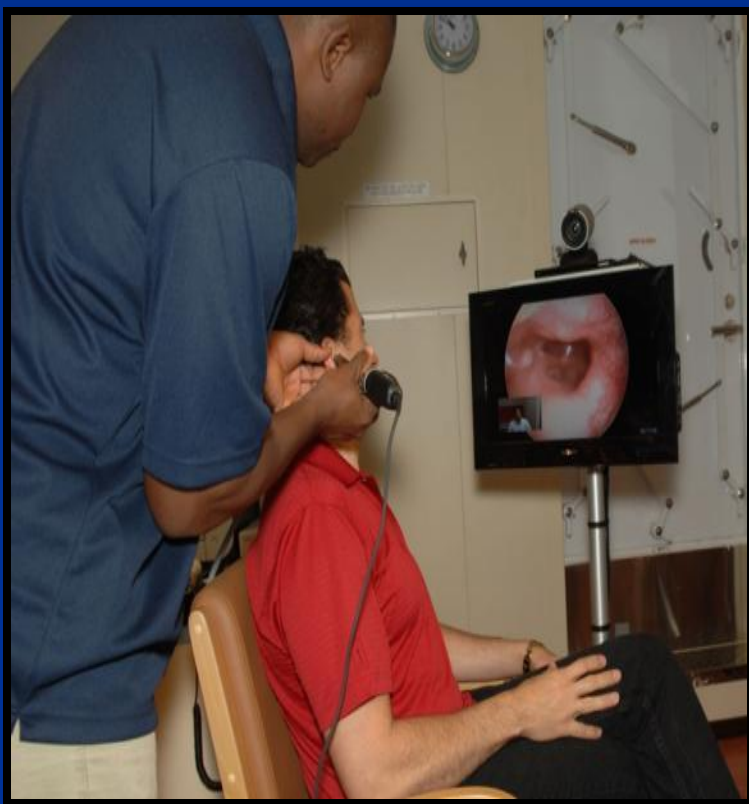- Educate you on common terminology
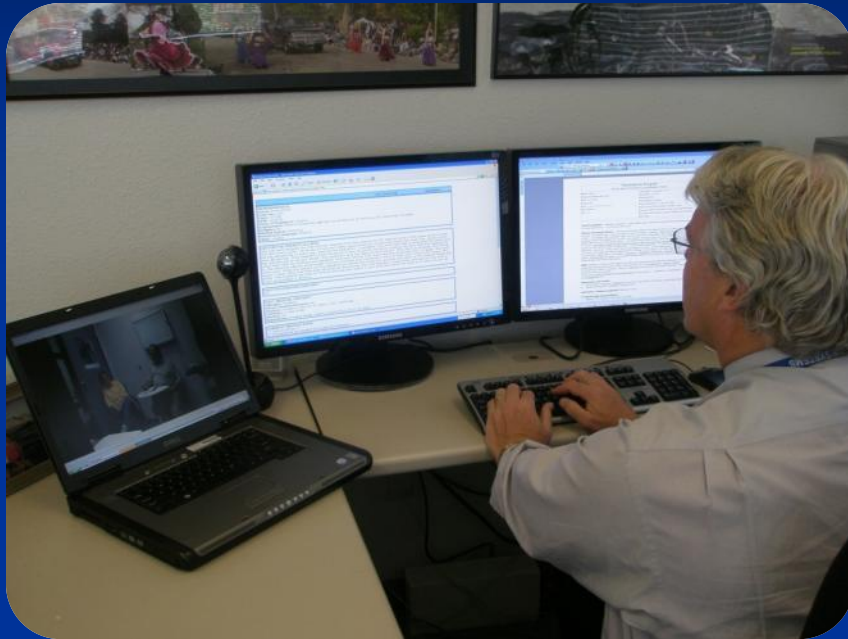
What is Telemedicine?

Interactive health care over distance using information or telecommunications technology

Telemedicine brings the knowledge of an expert to the point of care and allows that expertise to be customized for that patient

Live Real-time Video Based Telemedicine (Synchronous)

Store and Forward Telemedicine (Asynchronous)

- Capture still images, video clips, vitals, radiology, etc., which is transmitted to the physician

- Physician reviews at his location and replies with diagnosis and treatment plan

Store-and-forward telemedicine involves acquiring medical data (medical images, labs, etc.) and then transmitting this data to a doctor or medical specialist at a convenient time for assessment offline. It does not require the presence of both parties at the same time.
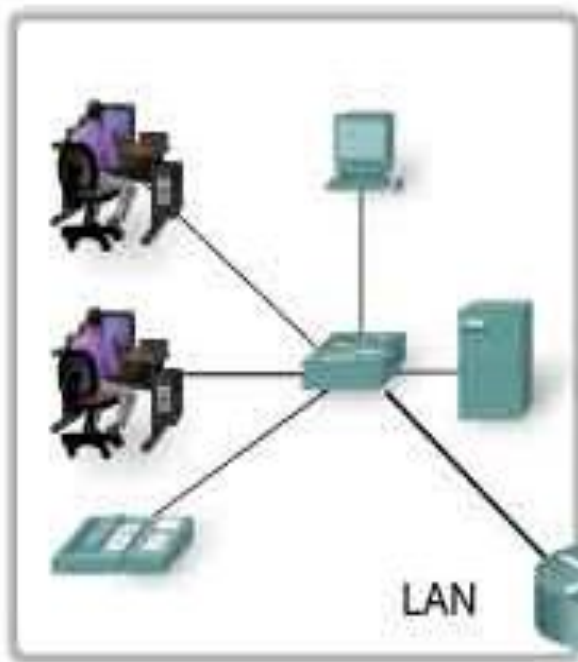
Big Myths?

- **Technology, it just works**
  - Network Infrastructure
    - Local Area Network (LAN)
      - The network connecting systems on your floor, building and close proximity buildings.
      - May be more of a barrier than the WAN
    - Wide Are Network (WAN)
      - The network connecting your LAN to locations offsite (a mile or futher)
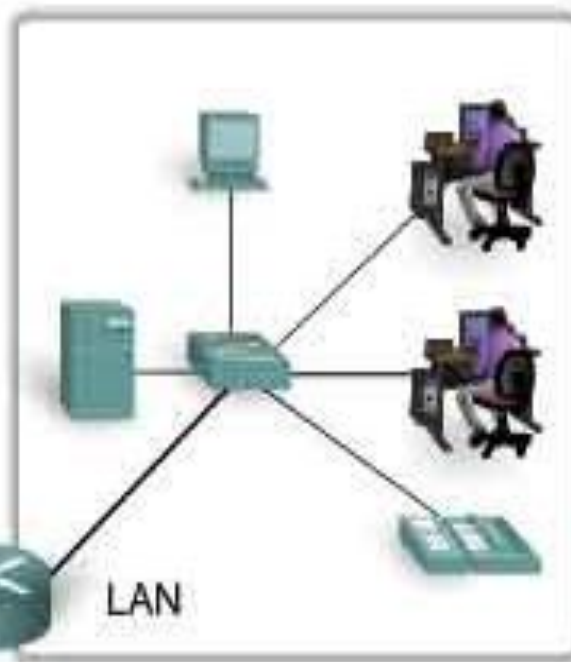
Telemedicine Networking

LANs separated by geographic distance are connected by a network known as a Wide Area Network (WAN)

Hospital in CA

Hospital in NY

LAN

WAN

LAN

Big Myths in Telemedicine?

- "Technology, it just works"
  - Network Infrastructure
  - LAN
  - Wan
  - Bandwidth

Bandwidth

- Bandwidth is the maximum amount of data (measured in bits per second) that can travel a communications path in a given time.

- The greater the bandwidth, the more information that can be sent which results in higher image and audio quality.

Bandwidth

- Measured in (bps) Bits Per Second

  (You could think of them as pipes)

- k=kilo=1000=thousand

- M=mega=1,000,000=million

- G=giga=1,000,000,000=billion

- T=tera=1,000,000,000,000=trillion

Big Myths in Telemedicine?

- "Technology, it just works"
  - Network Infrastructure
  - LAN
  - Wan
  - Bandwidth
  - Utilization

Telemedicine Networking

10%   **95%**

Network utilization is the amount of traffic on the network compared to the peak amount that the network can support. This is generally specified as a percentage

Big Myths in Telemedicine?

- "Technology, it just works"
  - Network Infrastructure
  - LAN
  - Wan
  - Bandwidth
  - Utilization
  - QOS

Telemedicine Networking
Quality of Service (QOS)

Carpool lane for data transfer…

Big Myths in Telemedicine?

- "Technology, it just works"
  - Technical Staff

One of the key components to a successful program

- Staffing
  - Physician Champion
  - Telemedicine Coordinator
  - Technical Staff
    - Responsible for:
      - Equipment installation, maintenance and troubleshooting
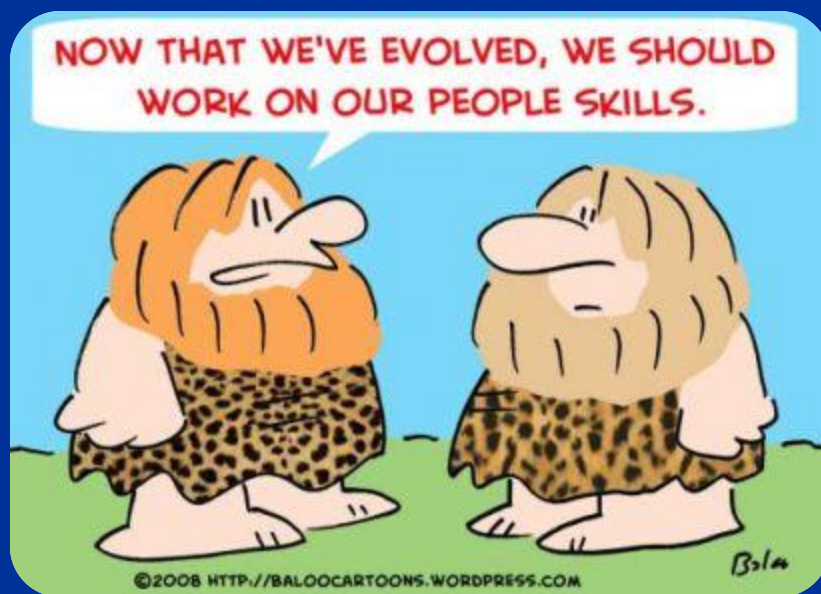   - Complex telecommunications and networking issues

Selecting the Right Technical Staff

"If you didn't understand what I said you'll just have read the manual!"

Selecting the Right Technical Staff

- Telemedicine requires your techs to communicate directly with your clinicians

- You can teach technology to someone interested in learning but can't teach people skills
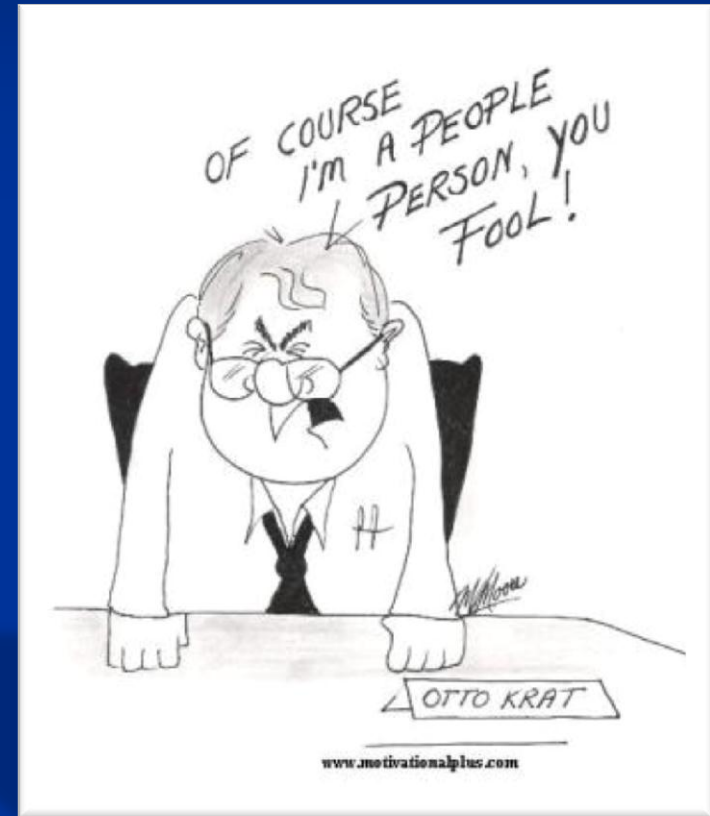

NOW THAT WE'VE EVOLVED, WE SHOULD WORK ON OUR PEOPLE SKILLS.

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Selecting the Right Technical Staff

- Skill Set
  - Techie with people skills
  - Patience when instructing
  - Experienced in health care
  - PC & Smart technology expertise
  - Good networking experience
  - Interested in audio and video
- Bonus
  - Experienced in video conferencing

Big Myths?

- ## Bigger is better…
  - Light weight
  - Easy to move
  - Hospital Grade UPS
    - Uninterruptable Power Supply
- ## Monitor - max size 25"

Big Myths?

- Doing Telemedicine over the Internet

- "Please have a seat, the doctor will see you in a couple of minutes or not at all"

Internet Connection
High Speed Broadband
"Your Private Onramp…"

Private onramp to Internet

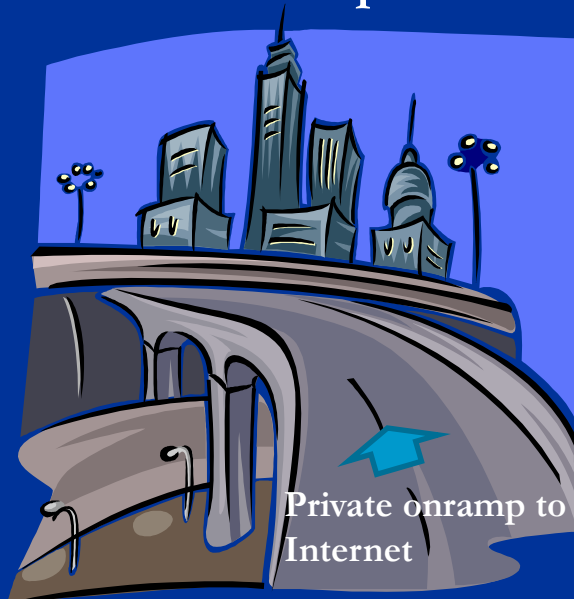**The Internet**
"The Freeway"
Extremely Cyclical

Big Myths?

- Internet **may** be a viable solution in the following circumstances
- One phone company end to end
- QOS (quality of service)

Internet Connection
High Speed Broadband
"Your Private Onramp…"

Private onramp to Internet

The Internet
"The Freeway"
Extremely Cyclical

Issues with Using the Internet

- No one controls the speed of the Internet

- Lip Sync

- Pixilation

- Calls can drop at any time

- Major delays in transferring large medical videos or images, etc.

Definition of the Internet

- Connected networks

- Internet is short for the word internetwork

Definition of the Internet

- **Hop = On the Internet, data packets need to go through several routers before they reach their final destination. Each time the packet is forwarded to the next router, a hop occurs.**

- **Latency = The amount of time it takes a data packet to travel from source to destination.**
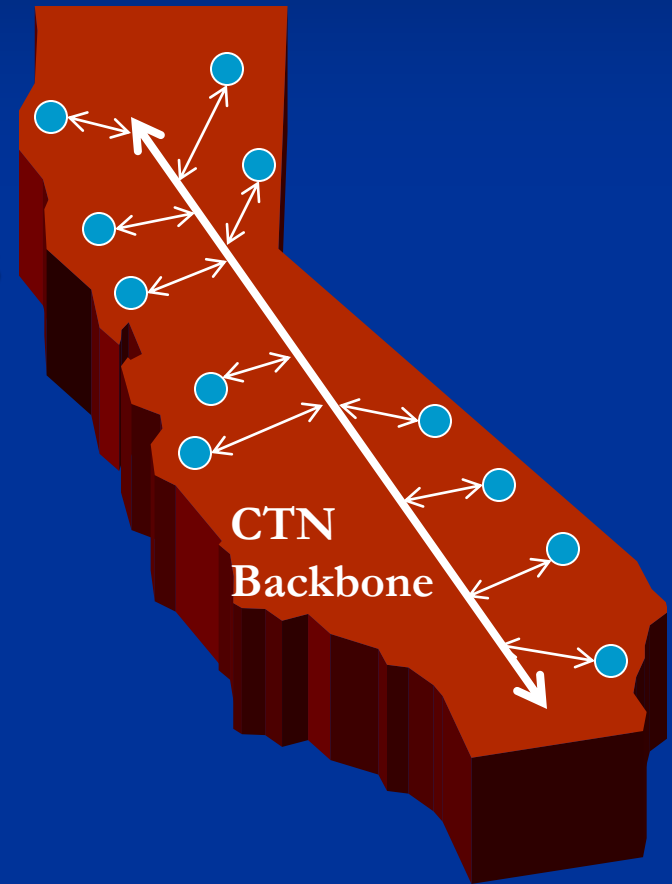
Definition of the Internet

- Can anyone can create a new Internet and not use the "Internet"?
  - Sure, It may not be as exciting or could it be?

California Telehealth Network

- A state wide broadband network dedicated to expanding health care access in rural and medically underserved communities

CTN Backbone

- Store and Forward Psychiatry
  - 30 Minute video (300mb) transfer over the Internet 3.5hrs. Transfer of the same file over the CTN takes about 4 minutes.
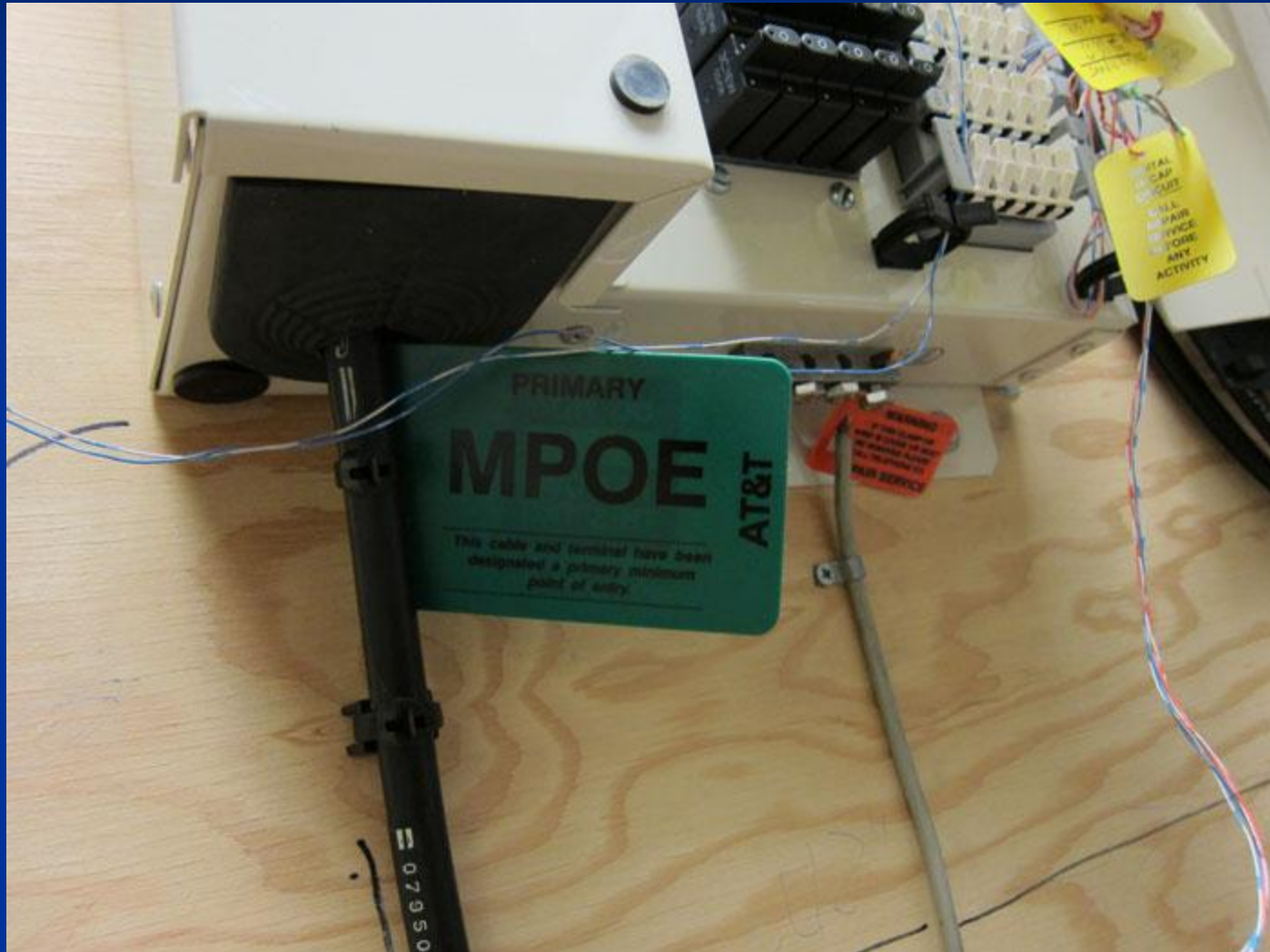
Other Networking Terms

Network Infrastructure

- MPOE
  - (Minimum Point of Entry)

Network Infrastructure
MPOE

Network Infrastructure

- MPOE
  - (Minimum Point of Entry)
- LEC
  - (Local Exchange Carrier)
    - AT&T, Sprint, Verizon, etc.
- LCON
  - (Local Contact) the person that the LEC is in communication with to install a circuit into the MPOE.
- IW
  - (Inside Wiring) gets extended from the circuit to the rack

Network Infrastructure

- From the MPOE the network is then connected to the firewall, router, switch, and patch panel inside the wiring closet which may or may not be the MPOE. It then connects the signal to the exam room's network jack into your Telemedicine system.
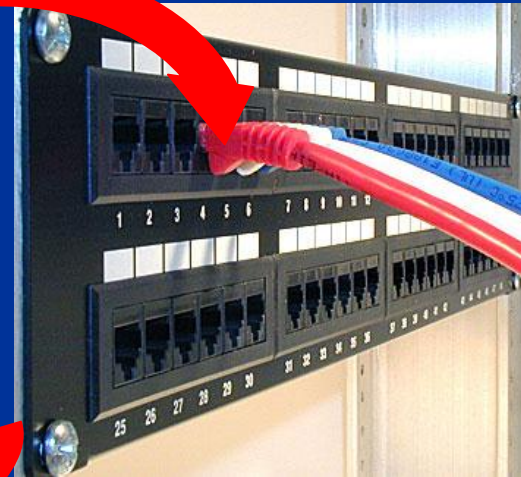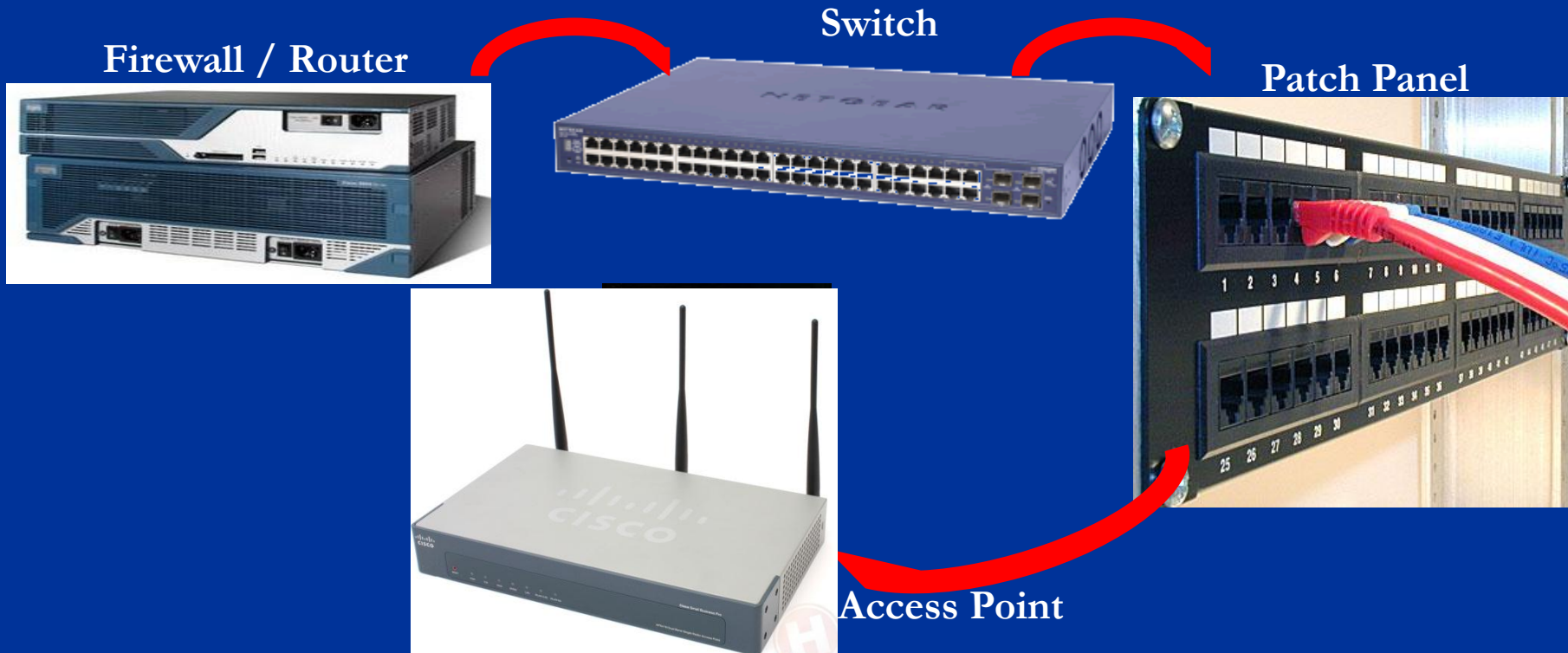
Switch

Firewall / Router

Patch Panel

Network Wall Jack

Should you make the switch to wireless?

- How does it work?
  - Swap out the network jack and replace it with a wireless access point

Firewall / Router

Switch

Patch Panel

Access Point

Should you make the switch to wireless?

- Considerations
  - What will be on the wireless network
  - Broadband
  - Utilization
  - Latency
  - QOS
  - Floors, walls, windows, etc.
- Spectrum analysis required

Choosing Your
Video Conferencing System

- Systems now are very reliable

- Budget

- Costs for service agreements

- Standards based versus proprietary

- Options available
  - Video Camera – quality of image and zoom optical power
  - Multi point conferencing capability
  - Audio/video Inputs and outputs
   - Manufacture models vary
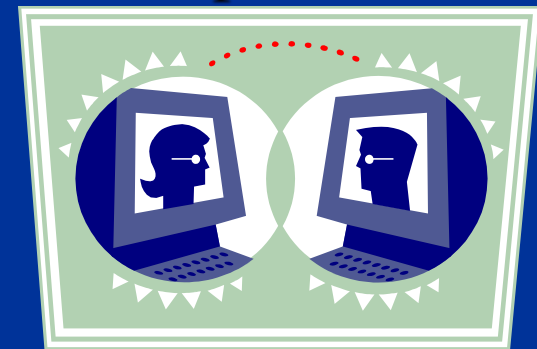
Monitor Selection

- Basically 3 Types currently available

- Plasma - The basic idea of a plasma display is to illuminate tiny colored fluorescent lights to form an image. Each pixel (the tiny dots on the display) is made up of three fluorescent lights - a red light, a green light and a blue light - which are evenly distributed on the screen.

- Smallest size an average 42"
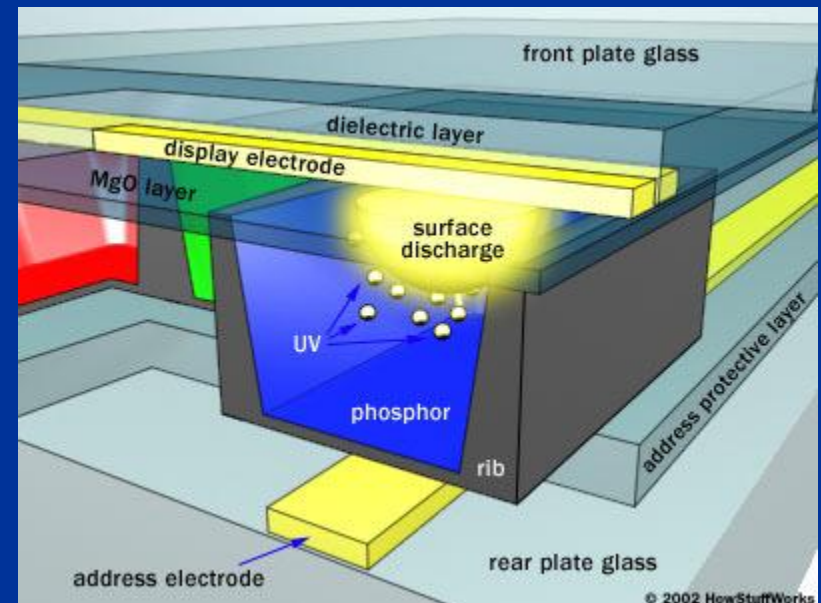
Monitor Selection

- LCD – (Liquid Crystal Display) - LCD technology works by blocking light. An LCD is made of two pieces of polarized glass that contain a liquid crystal material between them. A backlight creates light that passes through the first piece of glass. At the same time, electrical currents cause the liquid crystal molecules to align to allow varying levels of light to pass through the second piece of glass and create the images you see.

- Uses cold cathode fluorescent lights (CCFLs) to illuminate the screen
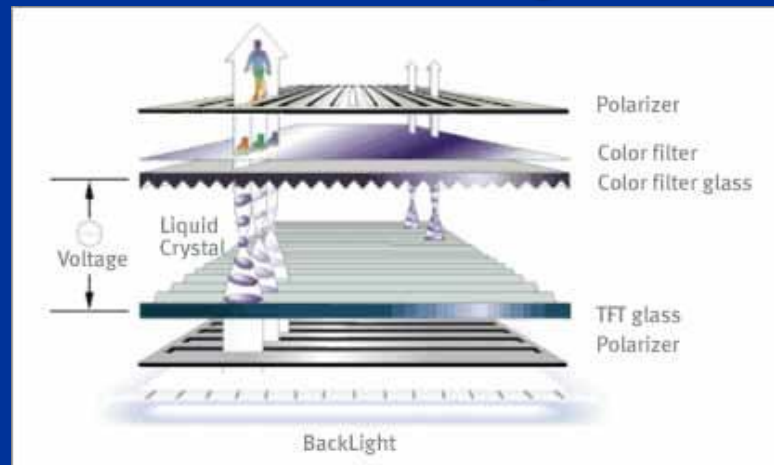
Monitor Selection

- LED – Are basically the same as a LCD monitor except that instead of using florescent bulbs to illuminate the display, Light Emitting Diodes to illuminate the display. LED backlighting has become much more common in the last few years, and CCFLs are now generally only seen on budget HDTVs.
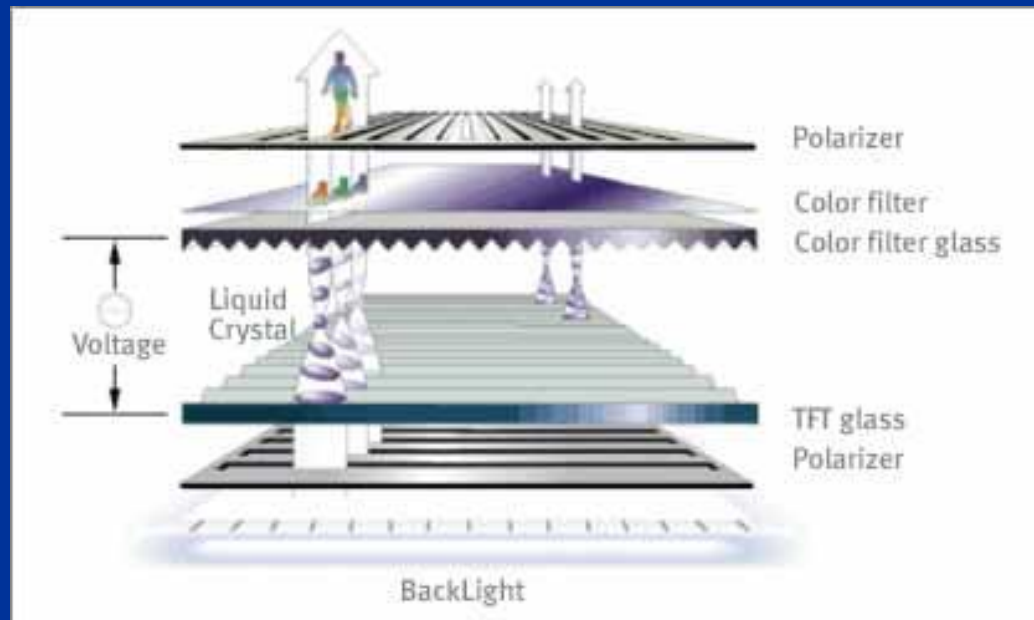
Monitor Selection

- Plasma – Great Blacks, fast refresh of pixels, better in low light conditions, smallest screen is 42", uses much more energy than LCD/LED monitors and releases quite a bit of heat.

- LCD – Very small, brighter than Plasma

- LED – Thinner than LCD, uses less energy, brighter than LCD and better blacks than LCD, significantly higher price

- Look for:
  - Faster refresh rate are aimed at reducing the "motion blur". In 60Hz, 120Hz, 240Hz

Choosing Medical Peripherals

Otoscope

General Exam Camera

Nasopharyngoscope

Slit lamp Imager

Fundus Scope

Choosing Medical Peripherals

- Ultrasound

Choosing Medical Peripherals

Retinal Camera

Dentistry Scope

DICOM Radiology Film Digitizer

Electronic Stethoscope

Fetal Doppler

Make the Connection

- How do medical peripherals connect to video conferencing systems monitors, networks and remote locations?

Make the Connection
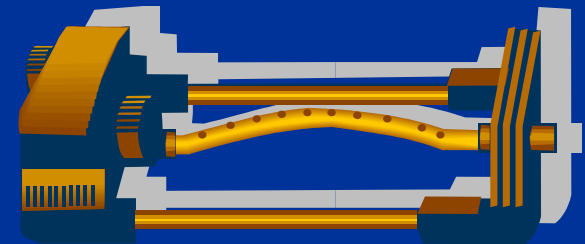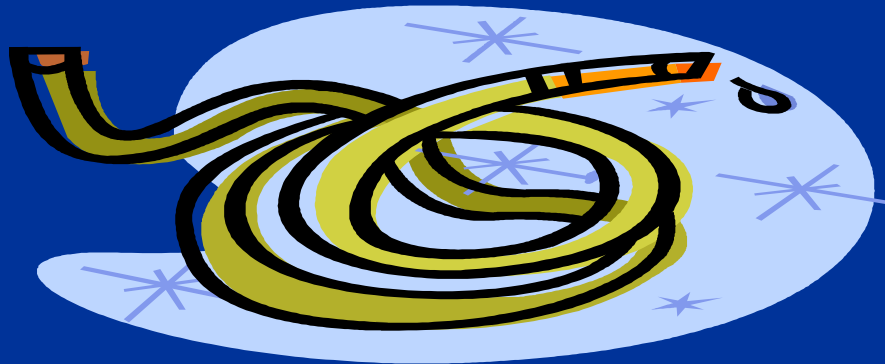# Basics of Electronics

Flows just like water

1 - "Out" of the Faucet

2 - "In" to the hose   3 - "Out" of the hose

4 - "In" to the sprinkler

Make the Connection
Basics of Electronics
Flows just like water

1 - "Video Out" of the Medical Peripheral

2 – To "Video In" on VC

3 - "Video Out" of the VC

4 - " Video In" to the Monitor

Standard Cable Connections

- Composite (RCA) Audio
  - White and Red
- Composite (RCA) Video
  - Yellow
    - Chrominance/Luminance
    - Ground

- S-Video
  - 4 pins
    - 1 Chrominance
    - 2 Luminance
    - 3 & 4 are grounds

Standard Cable Connections

- Component Video
  - R – Red
  - G – Green
  - B – Blue

- HDMI
 - Includes audio and video

- HDMI to DVI

Choosing Medical Peripherals

- Specialty
- Current video system
  - Audio/video connections
  - Standard Definition
  - High Definition
  - Many of the new VC systems don't even have composite and s-video connectors any more.
- What system does the site you are connecting to have?
 - Electronic Stethoscopes

What is Bluetooth?

- Bluetooth wireless technology is built into a wide range of products, from cars and mobile phones to medical devices and computers. Bluetooth technology you share voice, music, photos, videos, and other information wirelessly between two paired devices. (2400–2480 MHz)
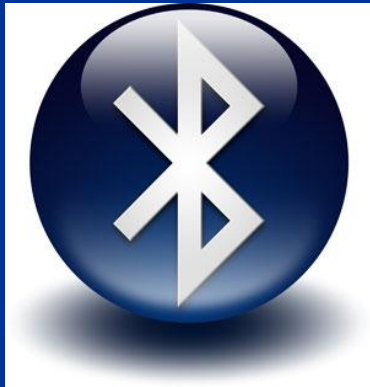
What is Bluetooth?

- The biggest difference between Bluetooth technology and devices like FM radios and TV is distance. Radios and TV are meant to broadcast to many people over miles or kilometers. Bluetooth technology sends information within your own personal space, which is called your Personal Area Network or "PAN" at distances up to 50 meters (164 feet). Class 1: range up to 100 meters (in most cases 20-30 meters) Class 2: range up to 30 meters (in most cases 5-10 meters)
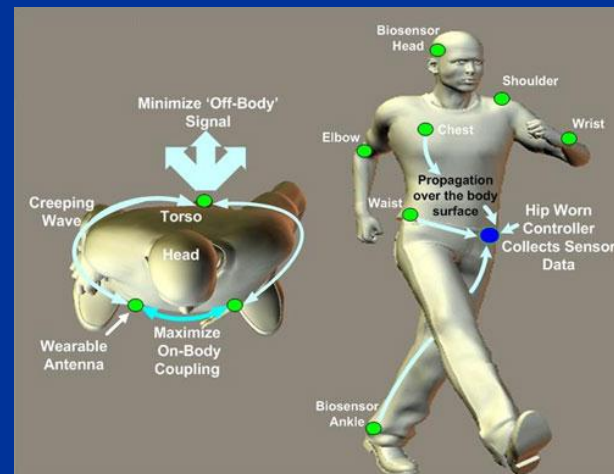
Standards-based Vs. Proprietary Telemedicine Systems

- Benefits of a proprietary system
  - Doesn't have to adhere to standards which could reduce the network amount of traffic for the same video quality of much higher bandwidth standards based systems
  - Can handle fluctuations in data speeds without dropping calls as easily
- Issues with proprietary systems
  - Can not connect to a standards based systems without other costs for transcoding systems or not at all.
  - Majority of systems are standards based
    - What type of systems are you connecting to?

Make the Switch Mobile Platforms

- Are you ready to make the switch from high-end video conferencing systems to laptops, ipads, and smart phones?
  - What specialties do you plan to support?
  - Texting medical data?
  - No physical inputs available, must use wireless.
  - What medical peripherals do you currently have?
    - Are they blue tooth enabled?
  - Do the sites you connect to have mobile technology and using the same applications. May or may not be an issue.
- Cloud Computing
  - Patient data storage – risk management
  - All data images are on the cloud
    - No local storage

Problem Solving

Tips to quickly solve issues

- Stay relaxed

- Keep in mind that most issues are simple fixes

- Keep a problem log and what fixed the issue

- Create and follow procedures flow chart

- Don't be afraid to ask for help

- Keep all of your technical support numbers handy

- While your systems are working well either tape unused connectors and/or take pictures

Future of Telemedicine Technology

- Wireless handheld devices designed specifically for Telemedicine with embedded sensors

- Wider selection of Bluetooth medical peripherals

- Cloud Services

- Healthcare Internets like the CTN in each state connected together

- Improved cellular speeds

- Home health systems that tie-in with cable TV subscriptions

Thank You, Questions?

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