

PACS, Computer Networks, and Teleradiology

PACS

Picture Archiving and Communications System: A system that integrates storage of digital media and provides an interface for viewing them.

Once an image is generated, PACS is used to transfer that digital image to a computer network that will store the image and display the image for physicians. Simply, this is the equivalent to connecting a digital camera to a personal computer. More commonly, this implies a large computer network that integrates and manages images from multiple modalities (eg CT, MR) at multiple locations (eg UWMC, HMC) and allows access from multiple clinical domains (eg radiology reading room, local access for clinicians). PACS is generally linked to a radiology information system (RIS).

Computer Networks

Smallest unit of storage capacity: 1 **bit** (binary digit). Bits grouped in bytes and 8 bits: 1 **byte**. When described as the capacity of computer memory, are defined in power of 2 (Ex : 1 kB: 210 Bytes). **Word**: 16, 32 or 64 bits depending upon computer system. **LAN** : Local area network. Ethernet is a type of LAN. Connects local computers within department. **WAN**: Wide area network, connects computers at large distances from each other. Largest WAN : Internet ! Data transfer rate of computer network: Megabits per second. (109 bps: 1Gbps). Maximal data transfer rate : **Bandwidth**. Maximal data transfer rate achieved : **Throughput**. **Node** : Each device on a network is called a node, whether computer or switching device. Connections between them are called **links**.

Local Area networks:

Bus: All nodes connected to a single bus. **Star**: All nodes connected to a central node. **Ring**: Each node connected directly to only two adjacent nodes. Very Large Networks and Linking Separate Networks: **Routers** : Specialized computers or switches to route packets among networks. **Transmission Control Protocol/ Internet Protocol**: TCP operates at Transport Layer (4) and IP at Network Layer (3). TCP divides info into packets and passes to Network layer. Network layer follows IP and routes packets to destination computer. Each Computer has individual IP address (4 billion of them out there !)

Long distance Telecom links:

Provided by telephone companies. Telephone modem (slowest) < ISDN < DSL < Cable Modem < Optic Cable (fastest).

Network security:

Firewall : A router/ computer used to connect two networks to provide security. It does not eliminate need for individual computer security. Three imp. security issues regarding networks: Privacy, authentication and integrity.

Teleradiology

Transmission of images to a distant site from where the images were acquired and then reporting back. Examples include Nighthawk. This is governed by the ACR standard for teleradiology

Teleradiology improves patient care by allowing Radiologists to provide services without actually having to be at the location of the patient. This is particularly key when a sub specialist such as a MRI Radiologist, Neuroradiologist, Pediatric Radiologist, or Musculoskeletal Radiologist is needed as these professionals are generally only located in large metropolitan areas working during day time hours. Teleradiology allows for trained specialists to be available 24/7.

In the United States, Medicare and Medicaid laws require the Teleradiologist to be on U.S. soil in order to qualify for reimbursement of the Final Read.

Pay varies depending on how much you work. One group states they will pay 300,000 with exceptional earning potential after one year. Other groups tout 7 days on 7 off with 18-26 weeks off per year.