* 03/09/18
* 2000 - connect humans in billions
* 2010 to now - humans are minority, devices generate most of the traffic
* Terminology
  + M2M connectivity
    - Machine to machine connectivity networks are extended to common household devices
    - Areas identified as IoT enablers
      * RFID
      * Nanotechnology
      * Sensors
      * Smart networks
  + Internet of Things (IoT) - <https://www.gartner.com/technology/research/>
    - Network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment
* Characteristics of IoT
  + Efficient, scalable, and associated architecture
    - Low power
    - Many nodes
  + Unambiguous naming and addressing
  + Abundance of sleeping nodes, mobile, and non-IP devices
    - Go off and come on and be IDed
    - Move between networks
  + Intermittent connectivity
    - Interact without internet
* Relevance of IoT
  + Market share
    - 40.2% - manufacturing/business
    - 30.3% - healthcare
    - 8.3% - Retail
    - 7.7% - Security
* Applications of IoT
  + Business/manufacturing
    - Real-time analysis of supply and equipment
  + Healthcare
    - Portable health monitoring, recordkeeping, safeguards
  + Retail
    - Inventory, smartphone purchases
  + Security
    - Biometrics, remote sensors
* Evolution of connected devices
  + ATM - 1974
  + WEB - 1991
  + Smart meters - early 2000s
  + Digital locks -
  + Smart Healthcare
    - Alerts for medical emergencies
  + Smart vehicles
    - Self-diagnosis
  + Smart cities
  + Smart dust
    - Measure chemical concentrations
* IoT enablers
  + Technology
    - Internet
    - Social networking
    - AI
    - Big data
    - Deep learning
  + Connectivity
    - Zigbee
    - RFID
    - Bluetooth
    - LoRA
    - WiFi
    - LoWPAN
* 4 layers of internet protocol(of the 7)
  + Physical
  + Network
  + Transport
  + Application
* Baseline Technologies (Closely related)
  + Machine-to-machine(M2M) communication
    - Devices
  + Cyber-Physical-Systems(CPS)
    - Applications
  + Web-of-Things(WoT)
* IoT vs M2M - Devices
  + M2M - Communications and interactions between devices
    - Managing devices and device interaction
  + M2M is part of IoT
  + IoT includes connectivity, not focused on use of telecom networks
* IoT vs WoT - Applications
  + WoT enables access and control over IoT resources
  + Focus on applications and development
  + Can be part of IoT
    - Option for application layer of internet
    - IoT doesn’t need the internet
  + IoT includes system not accessible through the web
* Iot Resulting in address crunch
  + 20-50 billion devices by end of 2018
* Connectivity terminologies
  + IoT LAN: local short range communication, may or may not have internet
  + IoT WAN: Wide geographic, connects to internet, connects network segments
  + IoT Nodes: connected to other nodes inside a LAN
  + IoT Gateway: Router connecting IoT LAN to IoT WAN **…….**
  + IoT Proxy: Performs active application layer functionality between IoT nodes and other entities
* Challenges
  + Addressing
    - IPv4 - unique addressing
    - Homing
    - Tunneling
    - IPv4 vs IPv6
  + Anchor points
* 03/14/18
* Actuators
  + Component of a machine or system that moves or controls the mechanism of the system
  + Actuator is the mechanism by which a control system acts upon an environment
  + Actuator requires a control signal and a source of information\
* 03/19/18
* Advanced Message Queuing Protocol (AMQP)
  + Open standard for passing business messages between applications or organizations
  + Connects systems and business processes
  + Binary application layer protocol
  + Basic unit of data is a frame
  + ISO standard: ISO/IEC 19464
  + Features
    - Security
    - Reliability
    - Interoperability
    - Routing
    - Queuing
    - Open Standard
* 04/04/18
* Research paper
  + on software defined networks
  + SWAT analysis
    - Strength, Weakness, Analysis, Threats
  + Will give pool of papers
  + Will have to read another and 10 minute presentation on it
* WSNs - coverage
  + Wireless sensor networks