

# The Internet of Things

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# Internet of what things?

- | Self-contained devices exchanging data
  - | Hardware and software
  - | Protocols (all layers) and APIs
- | Sensors and Actuators
- | Cloud components
- | Anything that can connect to the network
- | ~50 billion devices by 2020
- | It's the internet of all things!



# Applications

- | Environmental monitoring
- | Infrastructure management
  - | Transportation
- | Energy management
- | Building and home automation
- | Health
- | Entertainment



# Examples

- |Nest, PNM Power Saver
- |Google, Tesla, Uber cars
- |Lighting (too many to count)
- |Wearables
  - |We're ALL wearing one!



# Provider Network Impact

- |Addressing

- |Data usage

- |Security

  - |Many technologies and protocols involved

    - |All have different requirements

  - |Many devices have poor implementations

    - |Already being co-opted for DDoS attacks

  - |Internet of abandoned things

    - |Software updates



# Opportunity

- | Increased demand for bandwidth
  - | Fiber has best upstream
- | Beyond the demarc
  - | Direct sales
  - | Installation, configuration and maintenance
  - | Consult about security and privacy



# TBTC/TCI X-Services

- | Cloud-managed networking (routers, switches, WiFi)
- | Cloud-managed cameras
- | We don't sell hardware, we sell services
  - | Hardware is simply part of the service
  - | NRC is for installation only
  - | MRC based on amount of hardware deployed
- | 100% provider-managed
  - | If something fails, we detect the failure and replace it
- | Cloud-based cameras drive demand for upstream capacity



# Typical home?

- 17 devices on-line with nobody home
- Dozens of other devices behind protocol bridges

Active Address	▼ Active MAC Address	Active Host Name
192.168.0.107	50:85:69:9B:96:47	
192.168.0.123	48:60:BC:5D:11:98	Nicoles-iPhone
192.168.0.108	30:D6:C9:B0:A8:9A	android-dcc4b31f8e8073a
192.168.0.102	28:CF:E9:15:C9:59	Jeremiahs-MBP
192.168.0.120	1C:1B:0D:31:DB:18	speedy
192.168.0.115	AC:22:0B:61:44:99	android-c9130748c9382792
192.168.0.112	84:C9:B2:7E:89:A1	DNS-320
192.168.0.119	7C:E9:D3:06:4E:5D	Lappy
192.168.0.101	6C:AD:F8:30:E2:88	Chromecast
192.168.0.114	68:D9:3C:C3:BC:14	iPad
192.168.0.104	00:04:20:F6:61:6D	HarmonyHub
192.168.0.110	00:21:B9:00:E4:C3	ISY99-HOME-AUTO
192.168.0.118	00:BB:3A:BD:BA:B1	
192.168.0.106	00:BB:3A:68:3B:0E	kindle-ecbae069c
192.168.0.113	00:10:99:31:51:8B	00109931518b
192.168.0.109	00:0E:F3:34:28:69	
192.168.0.105	00:01:2E:3B:D9:57	redbeard





# Challenges in the Home Network

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