

# Why Should we care about L3?

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# Agenda

- The driving force... IIoT
- Market and technology overview
- So, what is this “layer 3?”
- OT/IT finally merging?
- Wrap up/Q&A



# The current model



Local controllers/PLC's



Local SCADA system

# The New Model



Local controllers/PLC's



Big Data

Analytics

Remote Dashboard

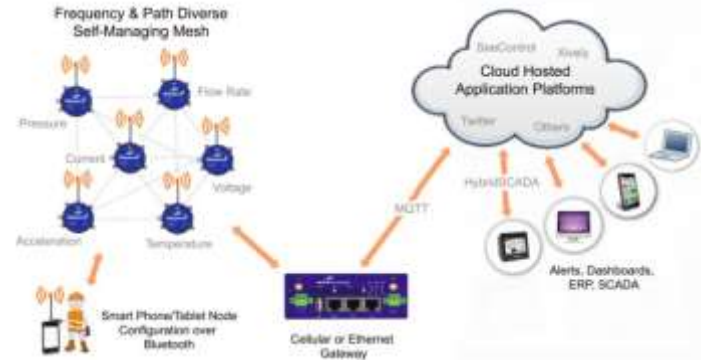
Local Dashboard

# IIoT

- Enhanced:
  - **data generation**
    - Local devices are either getting smarter, or “overlay” new sensor systems
  - **data collection**
    - No longer local
  - **data analysis**
    - The more data you own, the more decisions you can make

# IIoT

- Data generation:
  - Industrial devices are getting **smarter**
  - Enhanced sensor information, telemetry, health etc..
  - Or... overlay a new sensor/monitoring system



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Industrial Ethernet

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# Connecting Everything



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## Industrial Ethernet

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# IIoT - conclusions

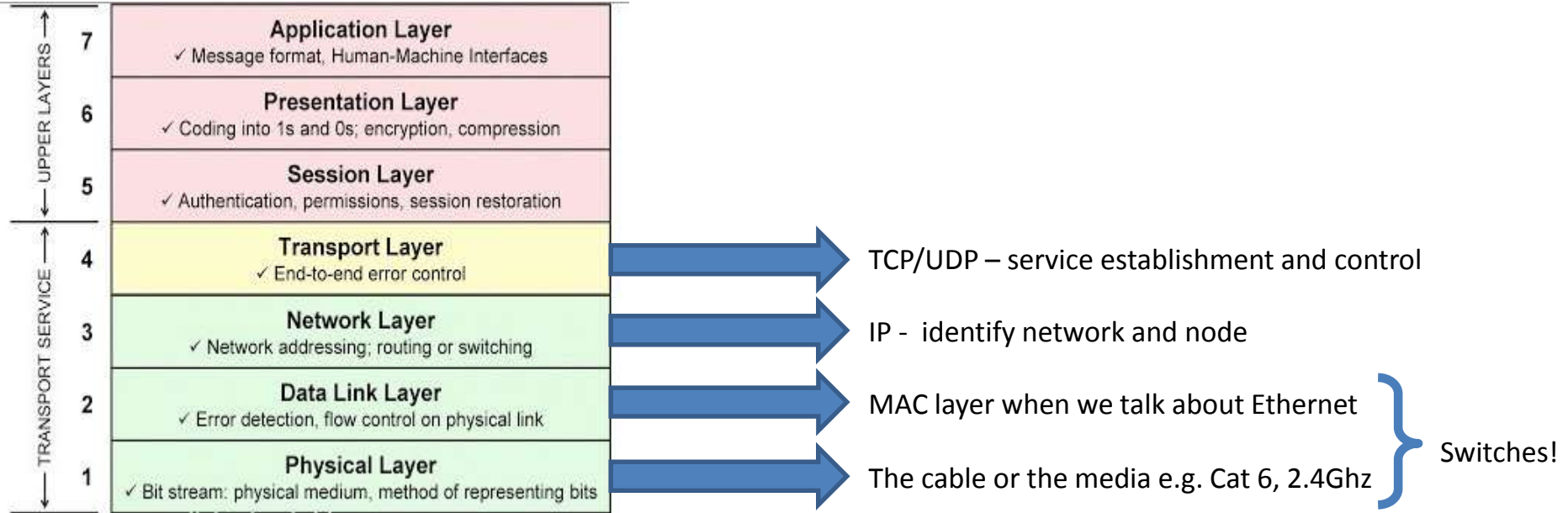
- The factory/manufacturing facility is getting smarter
- Data is no longer localized
- Amount of data being generated is growing exponentially
- The benefits of IIoT are real and are now becoming a critical differentiator

## So, what's this got to do with Layer 3??

# Why Layer 3?

- ✓ IoT will bring significant IP Traffic growth to both local and wide area networks. It's estimated that global IP traffic will reach > 1.6 zettabytes by 2018
- ✓ Connecting many devices together onto the same network is one of the biggest challenges of IoT. The structure of current OT/automation networks and the underlying technologies are coming under pressure from the exponential growth of IoT/IP. Interconnection is becoming a challenge
- ✓ All our “end points” (PLC's, HMI's, IPC, Box PC's, Cameras etc..), use TCP/UDP to communicate and establish sessions. These transport protocols rely upon IP (L3), node and network identification

# Layer 2 vs. Layer 3



# Layer 2 vs. Layer 3

- If Layer 3 provides identification (node & network), why do we need layer 2?
  - **Layer 3 was designed to be hardware agnostic**
  - Layer 2 is the hardware layer:
    - Ethernet, 802.11, ISDN, xDSL, DOCSIS, SDH, LPWAN, 802.11.15 etc...



Layer 1	Cat 6 <-> Cat 6
Layer 2	Ethernet <-> Ethernet
Layer 3	Node/network <-> Node/network
Layer 4	Transportation/session <-> Transportation/session

# IloT protocols

- All our “intelligent” devices use L3
- L3 is agnostic –
  - Wired, wifi, whatever – this is the data link
- IloT devices will use L3 for networking
- Transportation of data is typically MQTT, OPC UA, JSON etc...
  - BASED on L3 protocols

# Growth in L3 traffic (factory)

- Practical example:
  - Machine condition monitoring
    - 60 samples per second
    - Each sample +/- 1kbyte
    - +/- 450kbytes/sec
    - 14 motors = 6.3Mbytes/sec
    - 20 machines = 126Mbyte/sec

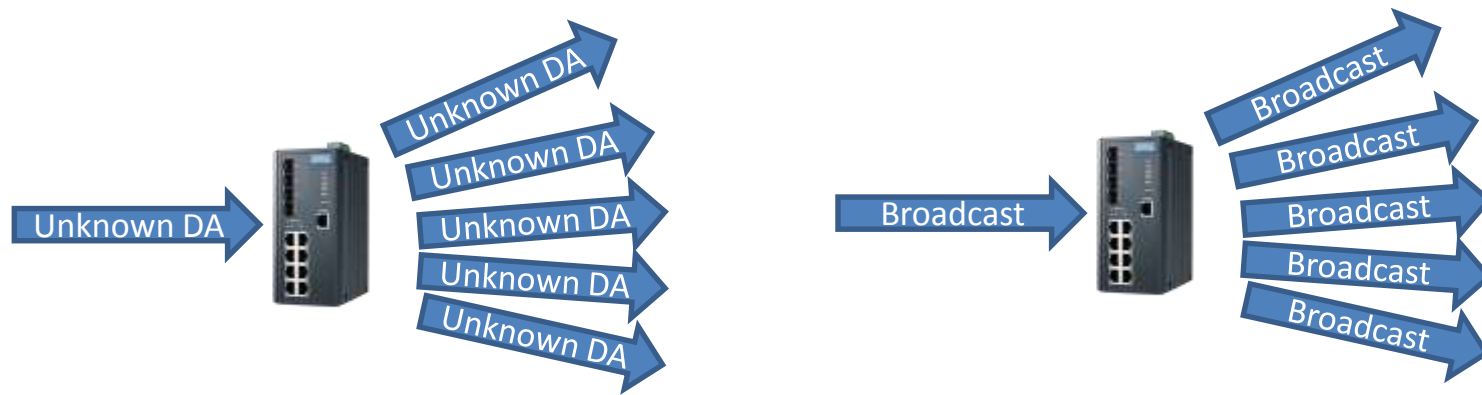


# So, what's the problem?

- Layer 2 is a bit 'dumb'
- Great for small/local networking – but simply does not scale
- Since our devices are now generating more data we get some serious issues appearing....

# Layer 2 - datalink

- If a DA is not in the MAC table then frame is transmitted through *\*all\** ports, potentially to all switches in the broadcast domain
- If the DA is a broadcast (FF:FF:FF:FF:FF:FF), then frame is transmitted through all ports
- As the network grows more “unnecessary” traffic will appear



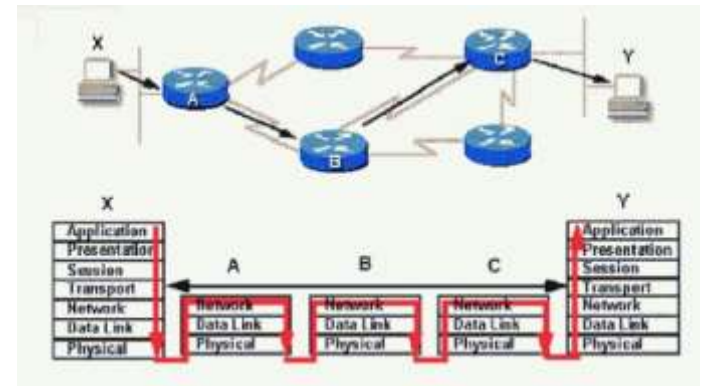


# Layer 3

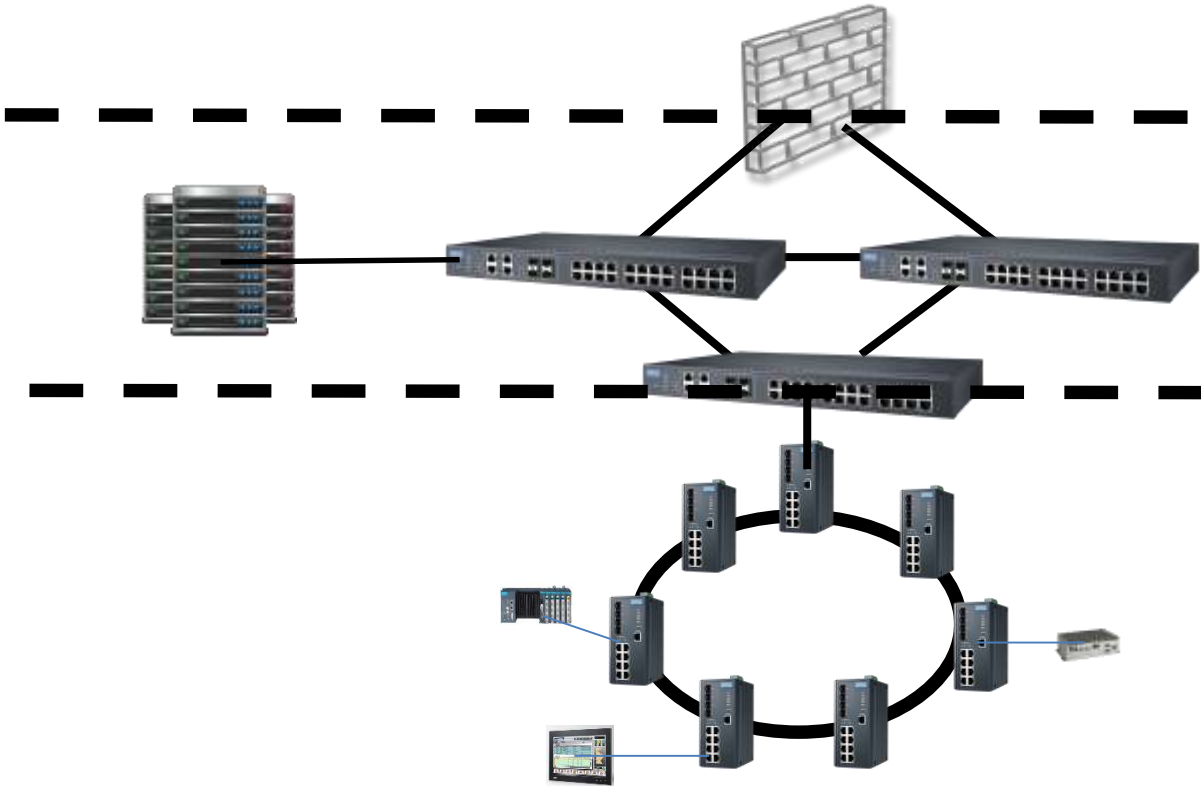
- The problems with Layer 2:
  - It's a flat network – all devices can see each other
  - Switches need to learn
  - VLAN's can reduce traffic, but need to be configured on a per port/per switch basis and are also limited (4,096 maximum)
- Layer 3 (network layer):
  - Uses IP to identify two components:
    - The Network
    - The node

# Layer 3 - routing

- The IP address identifies the network and then the node
- Routers make decisions based **upon the network ID**, not the node ID



# Zones



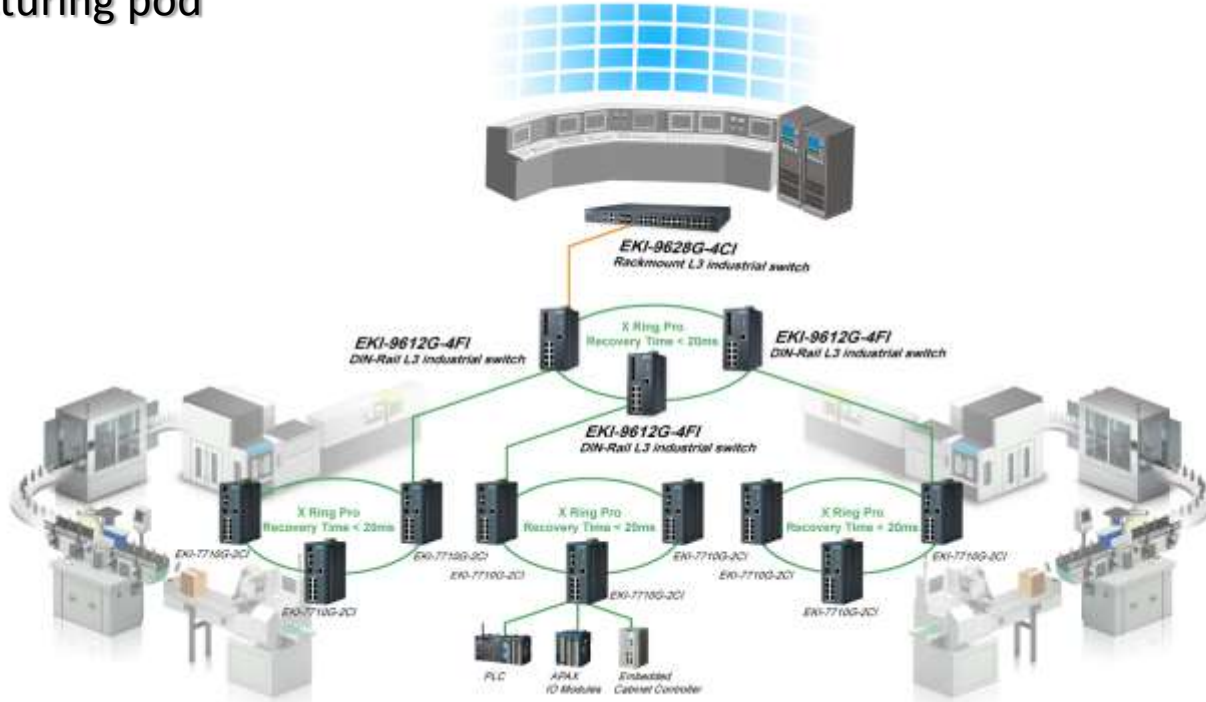
Enterprise/IT Network  
(Zones 4 & 5),  
WAN/Internet connectivity,  
ERP etc..

Manufacturing (zone 3), **L3**  
switching, servers, SCADA  
etc..

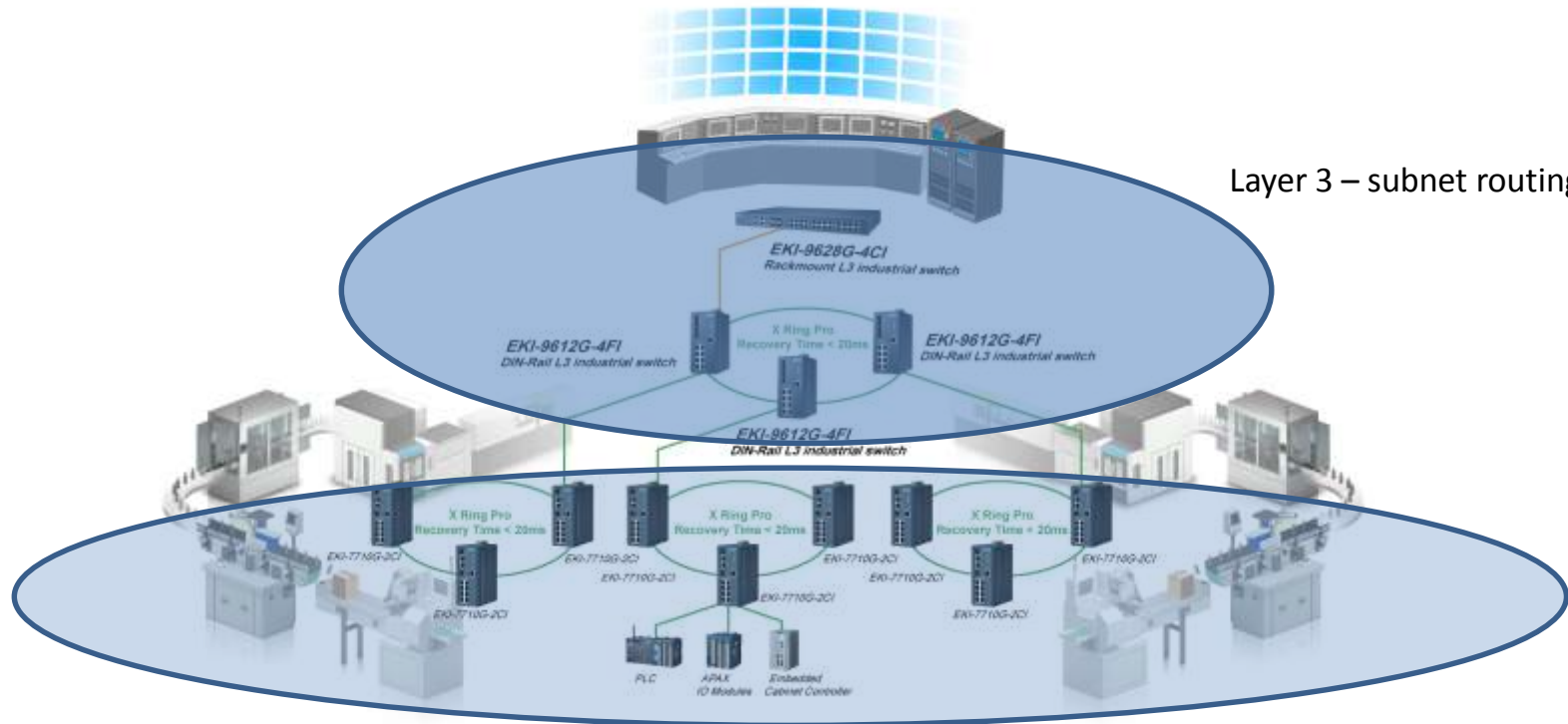
Cell/Area (Zones 0 to 2)  
Manufacturing equipment,  
**L2**, redundancy, VLAN

# Application Story

- Application: In a factory user separate production line into three individual subnets
- This enhances efficiency (traffic reduction), and security of each individual manufacturing pod



# L2 & L3 co-existence

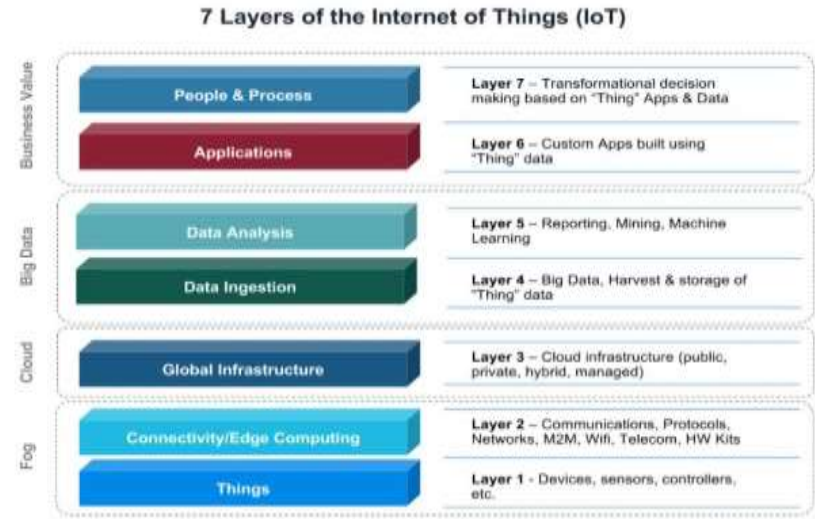


Layer 3 – subnet routing

Layer 2 – switched infrastructure

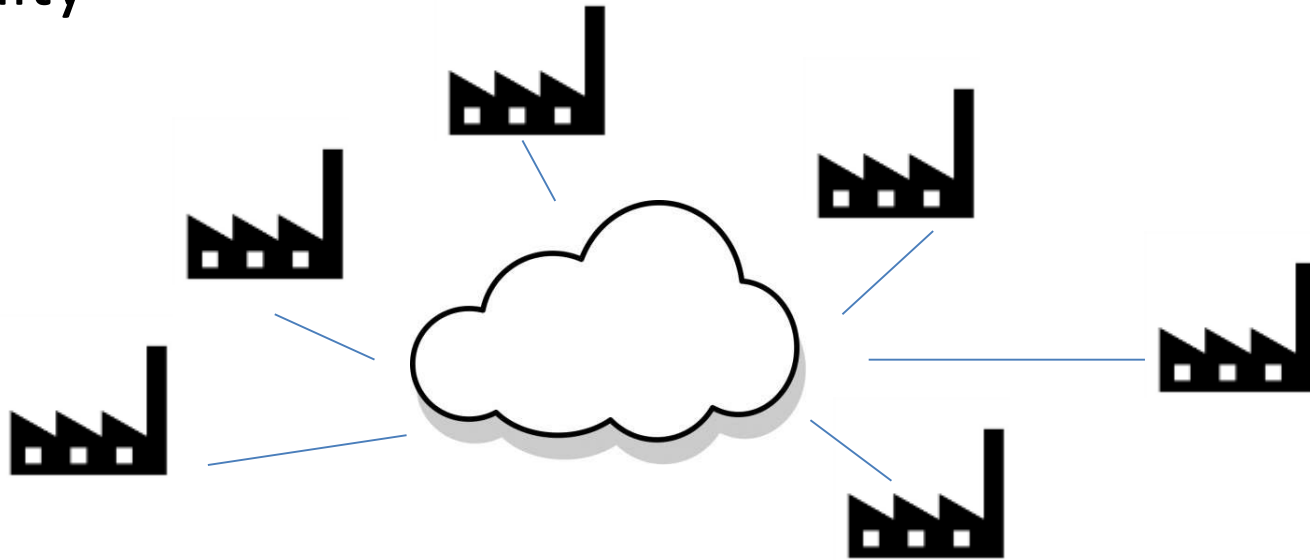
# IIoT & L3

- Traffic routing is critical
  - All our IIoT traffic is L3 based
  - Taking a subnet approach reduces traffic leakage
  - L3 routing on the “factory floor” is essential for IIoT applications



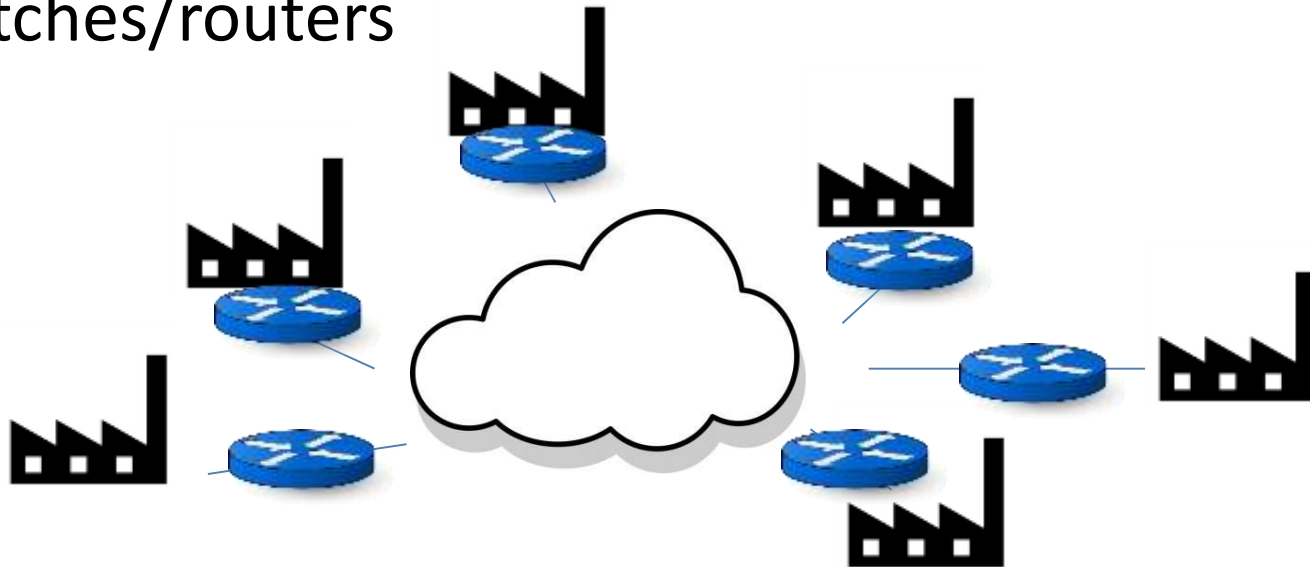
# Summary...

- IIoT is driving local traffic growth
- Cloud storage & analytics is forcing data to leave the facility



# Summary

- Leaving the factory – welcome to L3!!
- Only solution – deployment of L3 industrial switches/routers





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# Q&A

And thank you for your time!