SGCP
Les défis techniques de l'internet des objets

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TSA – Cisco France

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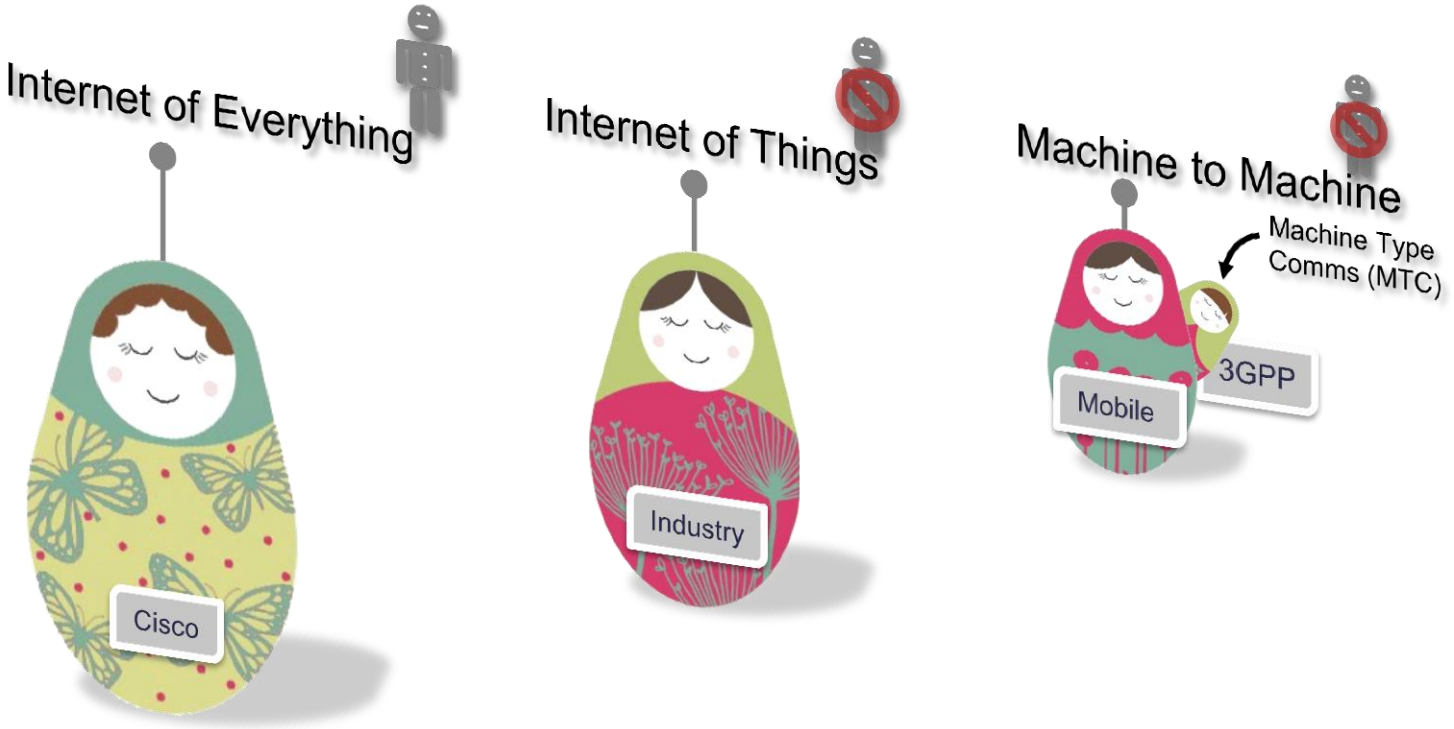
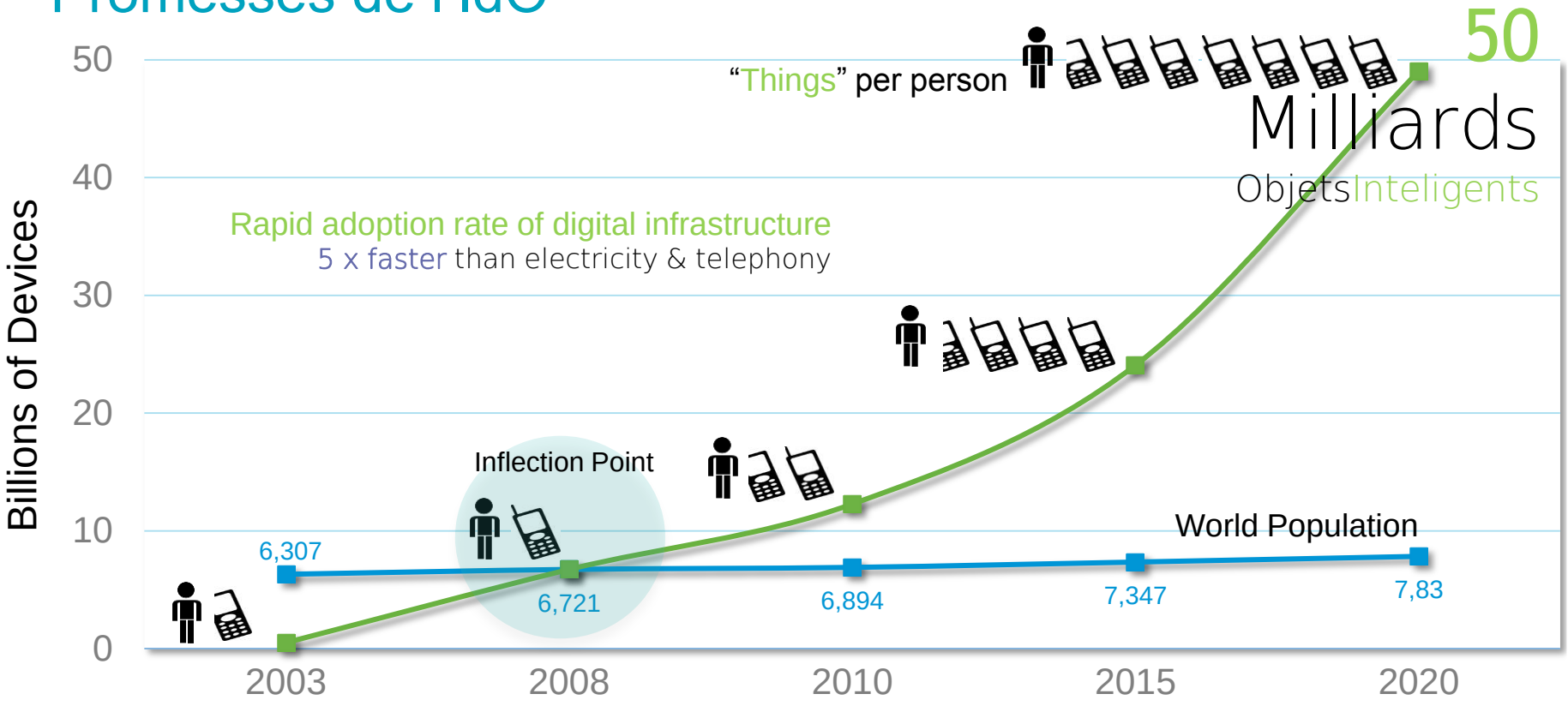
Relation entre IoE/IoT et M2M



Promesses de l'IdO

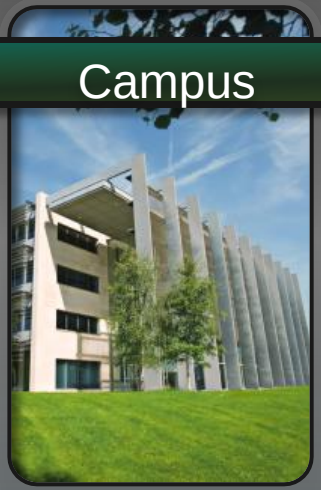


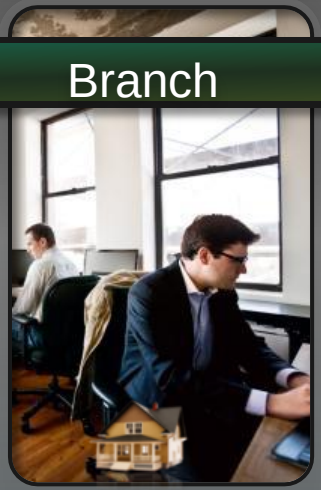
Cisco IBSG projections, UN Economic & Social Affairs http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf

Changement de paradigm

Information Technology (IT)

Operational Technology (OT)





IdO

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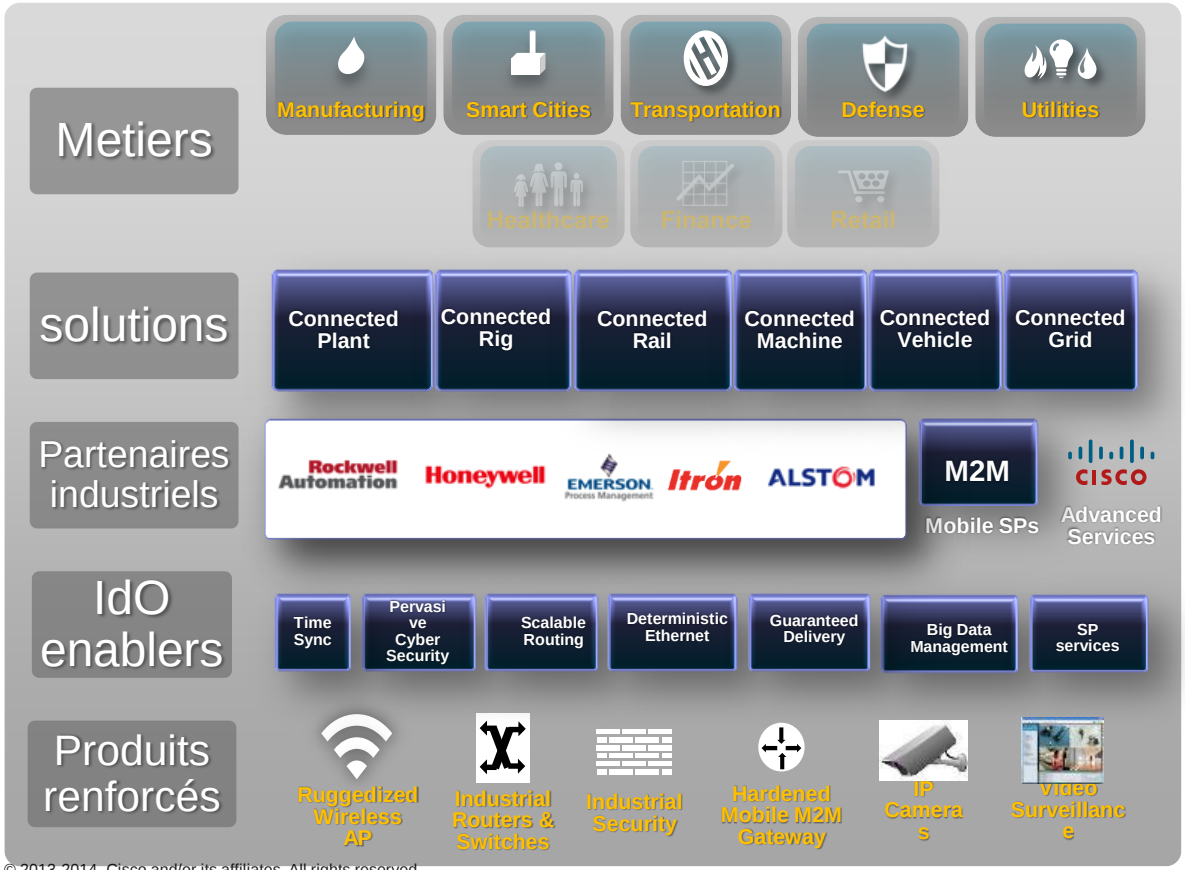
Construire un éco-systeme



Approche Cisco de l'IdO

"Customer-In" Approach

- Understanding of key business care about and pain points
- Relevance to LOB leaders / CXOs

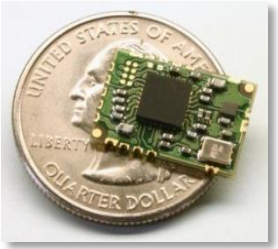
Products/Technologies

- Best-in-class ruggedized products
- Smart solutions for verticals
- IoT architectures

Strategic Partnerships

- Industry partners
- Vertical software / service partners
- Service providers

Contraintes dans les objets intelligents



Les challenges de l'agrégation des données

1.1 Billion

Data points generated by sensors daily

500 Gigabytes

Data generated by an offshore oil rig weekly

1000 Gigabytes

Data generated by an oil refinery daily

10,000 Gigabytes

Data generated by a jet engine every 30 minutes

2.5 Billion Gigabytes

Data generated worldwide daily

90% of the world's data

Has been created in the last 2 years!

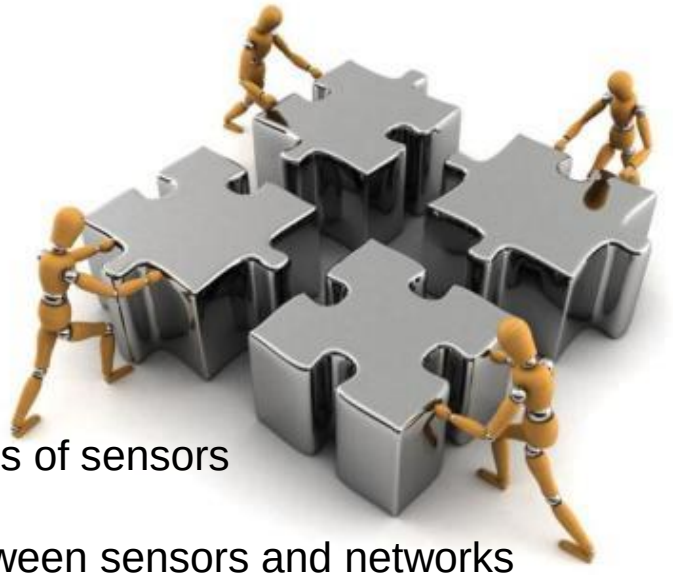
Autres Challenges à l'adoption de l'IdO

Challenges Business

- Must prove sensors have business value
- IoT applications must be profitable

Challenges Politiques

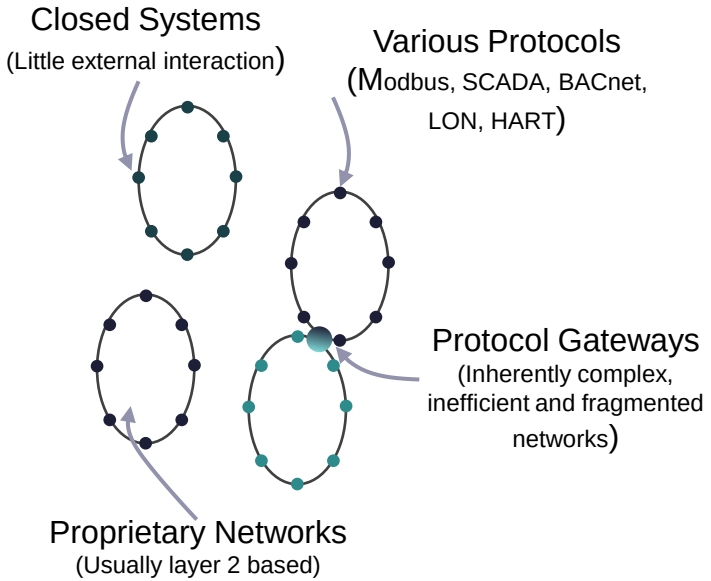
- Data security, data privacy issues
- Legal challenges for poor automated decisions



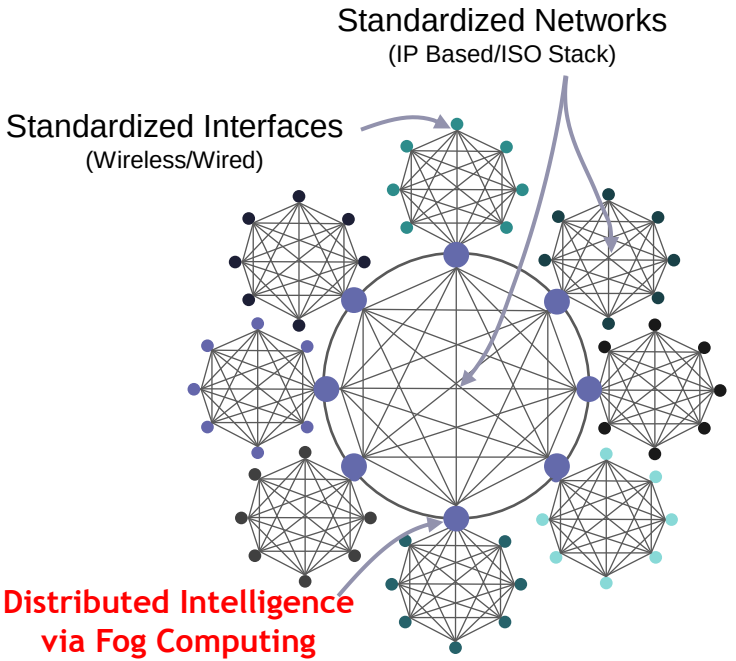
Challenges technologiques

- Developing energy sources for millions – or billions of sensors
- Establishing a common set of standards
- Technologies must evolve for free flow of data between sensors and networks
- Transition to IPv6
- Enhanced software apps will be needed

Évolution d’architecture des réseaux IdO



From



To

Architecture de FOG computing pour l'Ido

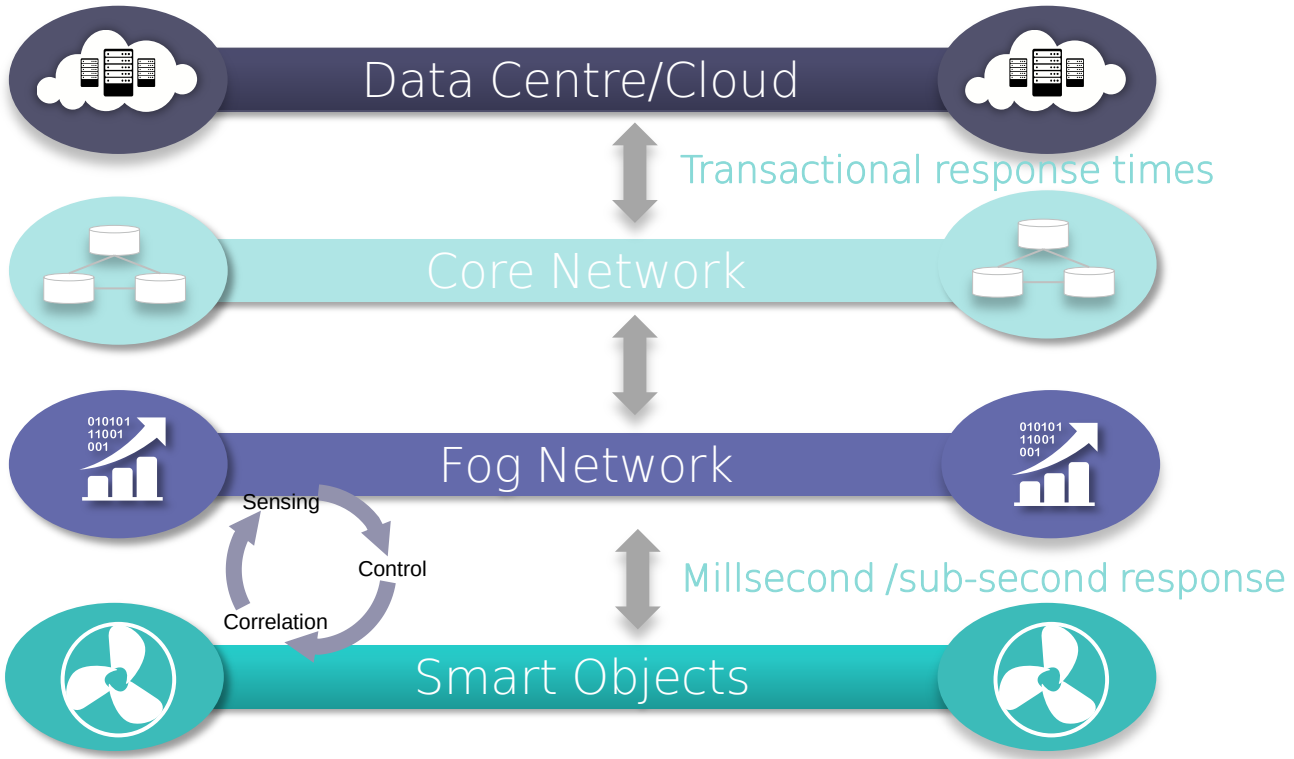
Data Volume, Variety & Velocity, Security, Resiliency, Latency

Hundreds
Data Centre/Cloud
Hosting IoT Analytics

Thousands
Backhaul
P/MPLS, Security, QoS, Multicast

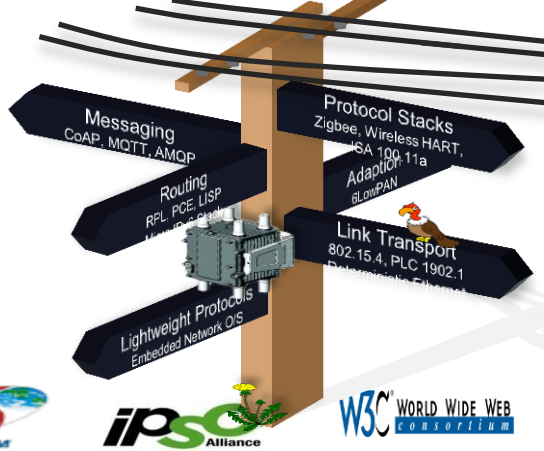
Tens of Thousands
Multi-Service Edge
3G/3G/LTE/WiFi/RF Mesh/PLC

Millions
Embedded Systems & Sensors
Low power, low bandwidth



Protocoles IPv6 de l'IdO

- Various protocols applied to IoT networks
- Relevant Protocols for different layers
  - Link Layer (eg., 802.15.4, PLC)
  - Adaption Layer (6LowPAN)
  - Routing (eg., RPL)
  - Messaging (eg., CoAP)



App. Layer	NETCONF/SCEP		IEC 61968 CIM C12.22 / C12.19 DLMS COSEM	IEC 61850	IEC 60870	DNP	MODBUS
	HTTPS/SSHv2	CoAP					
Comm. Network Layer / Network Functionality	TCP/UDP						
	Routing RPL	IPv4 / IPv6	Multicast, QoS, Security				
	802.1x / EAP-TLS based Access Control Solution + 802.1AR						
PHY / MAC Functionality	6LoWPAN			IETF RFC 2464			
	IEEE 802.15.4e	IEEE 802.15.4e MAC Extensions					
	IEEE 802.15.4 2.4GHz DSSS	IEEE 802.15.4e FHSS IEEE 802.15.4g (FSK, DSSS, OFDM)	IEEE P1901.2 (G3-based PLC)	IEEE 802.11 Wi-Fi	IEEE 802.3 Ethernet	2G / 3G / LTE Cellular	IEEE 802.16 WiMax

Legacy | New protocol for IoT | Existing IP protocols

Comment le réseau doit évoluer pour supporter l'IdO !

	Reseau IT		Reseau IdO
What the network does	Delivers information and applications	+	Makes intelligent decisions
Technology Care Abouts	• High availability • Reliability • Speed • IPv4	+	• Massively scalable and elastic • Distributed • Programmable • IPv6 Enabled • Bridges M2M infrastructure, traditional networks, cloud-based services
Critical network characteristics	• Compatible with proprietary, industry-specific, closed loop solutions	+	• Open and flexible • Mutually independent network – Operates without impacting other components, services or features
What the network connects	People to: Applications, services, people	+	• Machines To: Machines (M2M), people/humans (M2H) • Objects/Things to: Machines, people

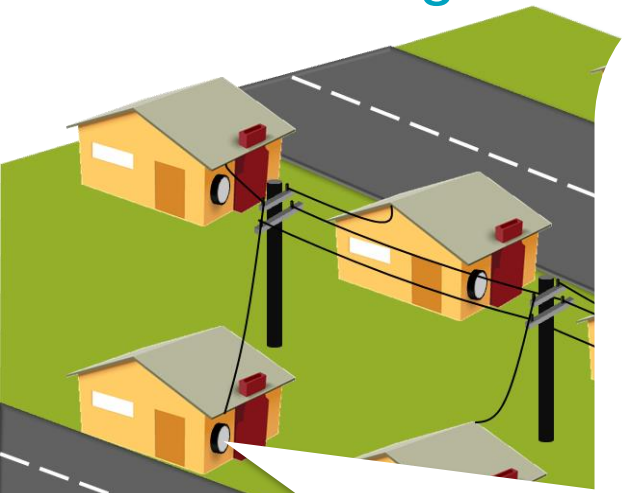
Ne pas travailler de manière incrémentale par rapport aux réseaux d'aujourd'hui ….

Thank you.

RPL Configuration at DODAG Root (Field Area Router)

```
interface Ethernet2/3 !Interface to WAN side
  ipv6 address 2001:420:7bf:5f::99/64
  ipv6 dhcp relay destination 2001:420:7bf:5f::100! Upstream towards DHCP
server
!
interface Wpan4/1 !Interface to Wireless Mesh (NAN)
  ipv6 address 2001:dead:beef:6104::/64
  rpl prefix 2001:dead:beef:6104::/64 !IP Subnet of RPL network
  panid 4660                          !802.15.4 PAN Co-ordinator ID
  ssid enercon_nan                    !Utility network name
  txpower -21
  ipv6 dhcp relay client-interface    ! Downstream towards meters in NAN
```

Meter Configuration via CG-NMS (Device Properties View)



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00173BAB003C0D00

Show on Map

Device Info

Type:	Cisco Connected Grid Mesh Endpoint
Status:	up
IP Address:	2001:dead:beef:cafe:aaaa:0:0:4
Map Location:	39.0, -90.0
Last Heard:	05/30 01:49
Mesh Link Transmit Speed:	395.89 bits/sec
Mesh Link Transmit Packet Drops:	0 drops/sec
Mesh Link Receive Speed:	822.83 bits/sec

NETWORK INTERFACES

Interface	IP Address	Physical Address	Tx Rate (bits/sec)	Tx Drops (drops/sec)	Rx Rate (bits/sec)
lo	0:0:0:0:0:0:0:1		0		0
lowpan	2001:dead:beef:cafe:aaaa:0:0:4 fe80:0:0:0:217:3bab:3c:d00	00173bab003c0d00	395.89		822.83
ppp	fe80:0:0:0:0:0:0:1	00173bab003c0d00	0		0

NETWORK ROUTES

Destination	Next Hop IP Address	Next Hop Element ID	Interface	Hops	Path Cost	Link Cost	RSSI	Reverse RSS
default	fe80:0:0:0:217:3bab:3c:d01	00173BAB003C0D01	lowpan					

PATH TO NMS

Hops	IP Address	Element ID	Status	Last Heard
this element	2001:dead:beef:cafe:aaaa:0:0:4	00173BAB003C0...	up	05/30 01:49
1 hop	2001:dead:beef:cafe:aaaa:0:0:6	00173BAB003C0...	up	05/30 01:48
2 Hops	10.22.61.201	cgmesh-calabria	up	05/30 01:35

Meter Configuration via CG-NMS (Map View)