

Cell Vers la 5G

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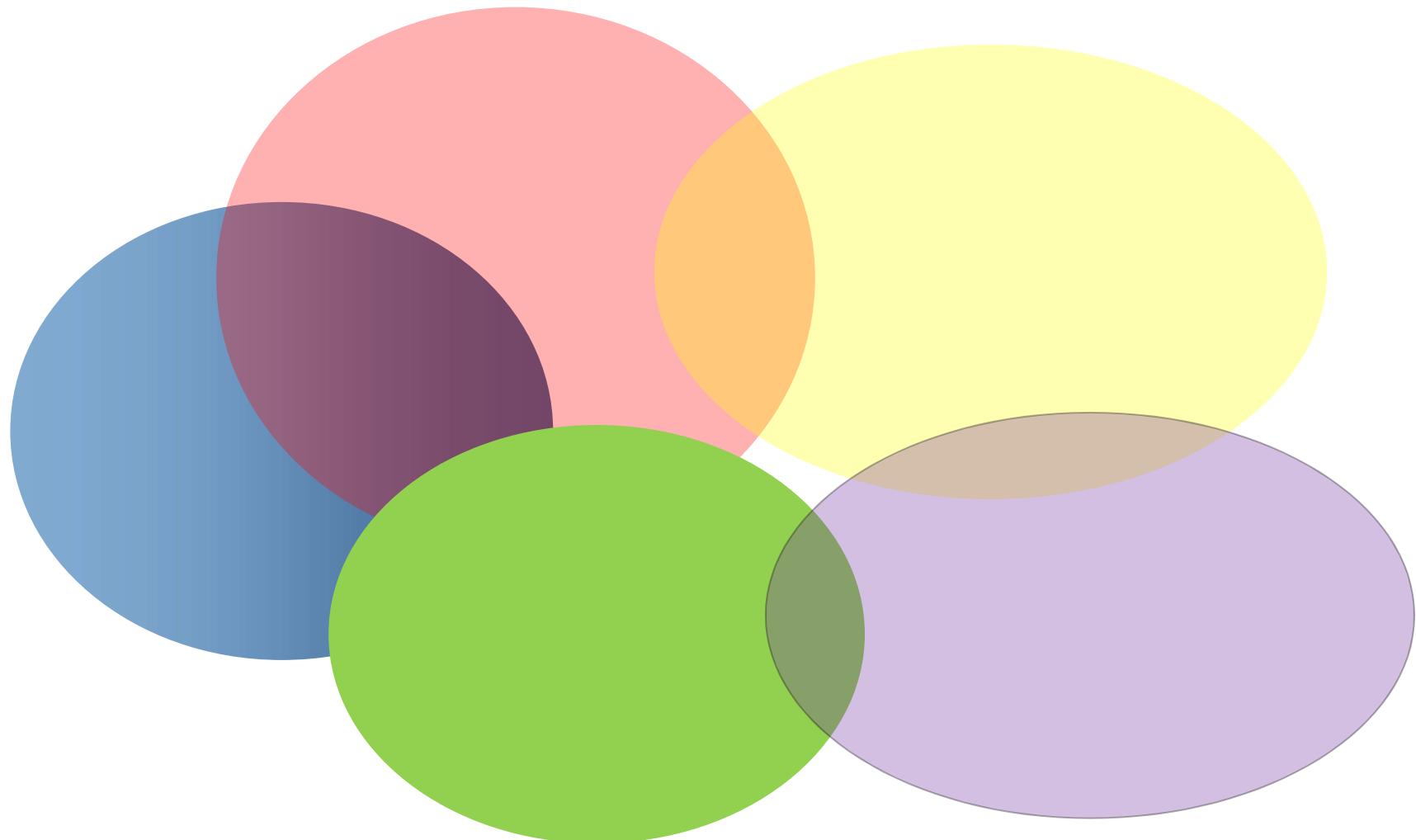


« Small Cells »

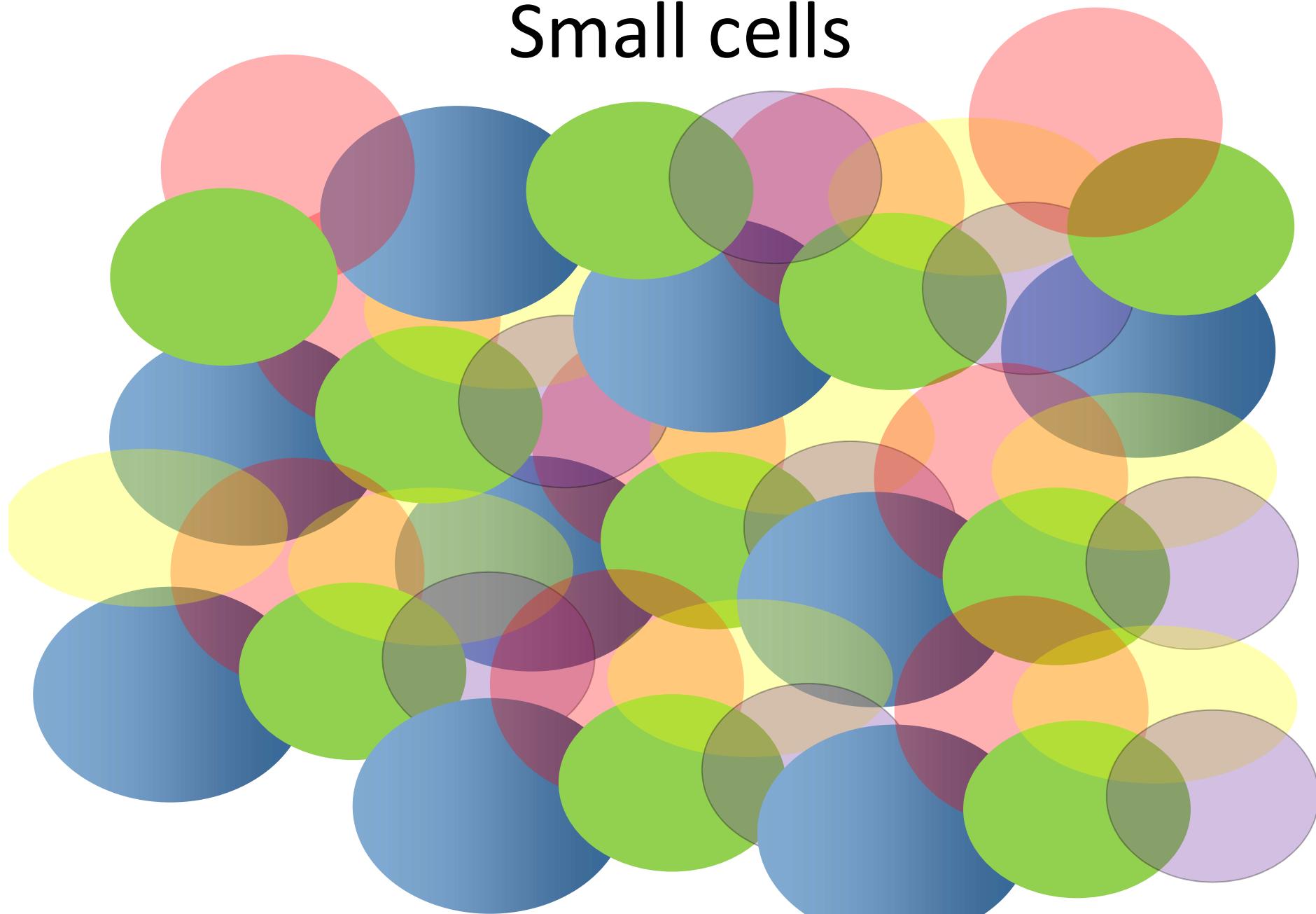
Problem



Large cells



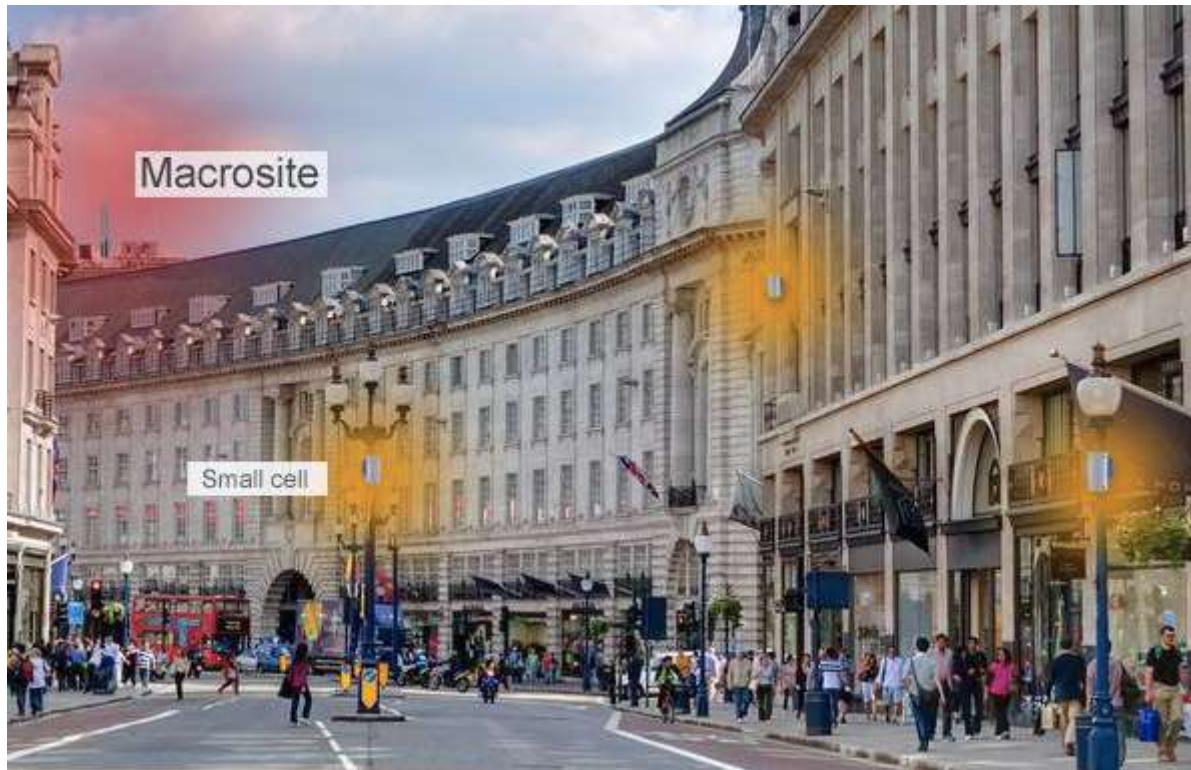
Small cells



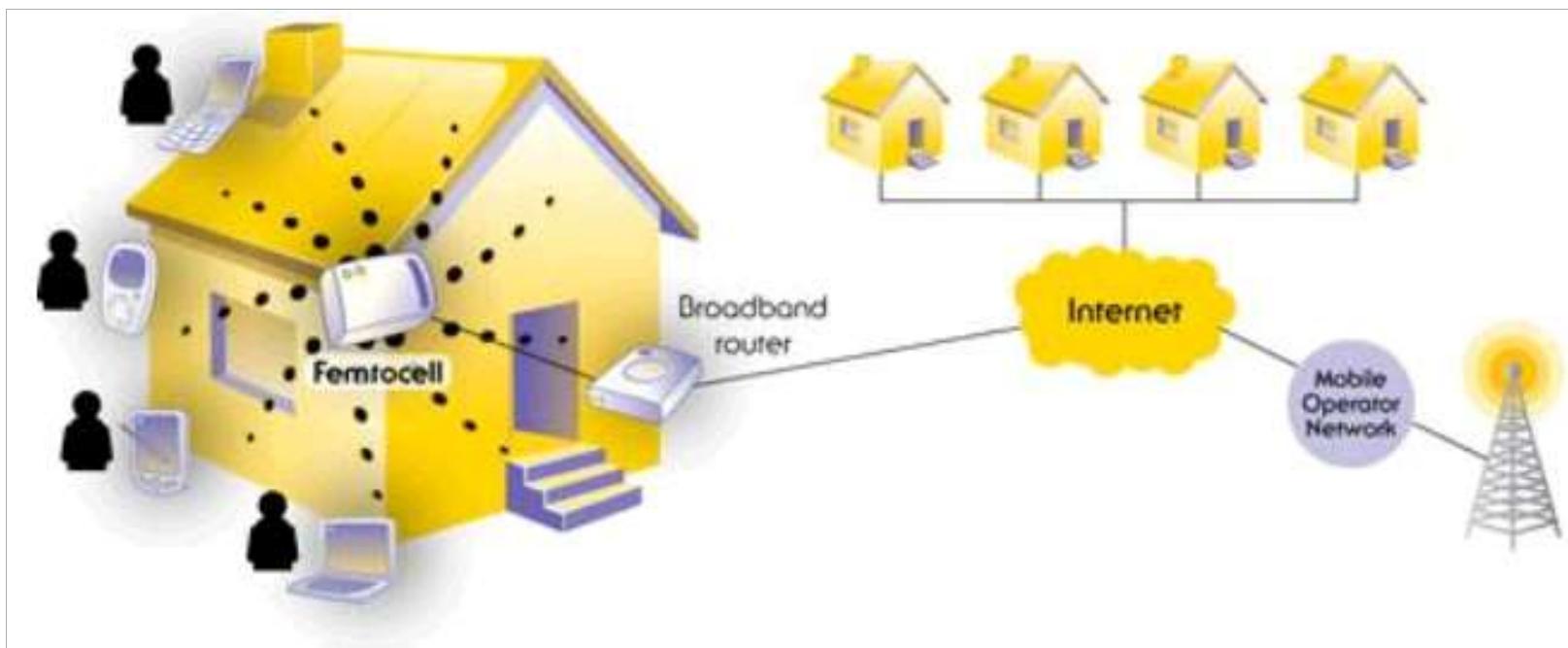
Small Cell

- Femtocell (dans le domicile)
- Picocell (dans les entreprises)
- Metro cells (dans les environnements publics)
 - Jusqu'à 32 utilisateurs
 - 100m de portée

Small cells vs macro cells



Femtocell



Home Node B (HNB)



Home Node B (HN



Example: Huawei HNB

- Volume: < 1 l.
- Weight: < 0.5kg
- Capacity:
 - 4 voice sessions AMR (Adaptive Multi-Rate)
 - 8 data sessions
- Connectivity: 3G, 3G+

Home Node B (HNB)



3G/4G



ADSL

**Core
network**

HNB



3G/4G over Wi-Fi

GAN/EGAN - UMA



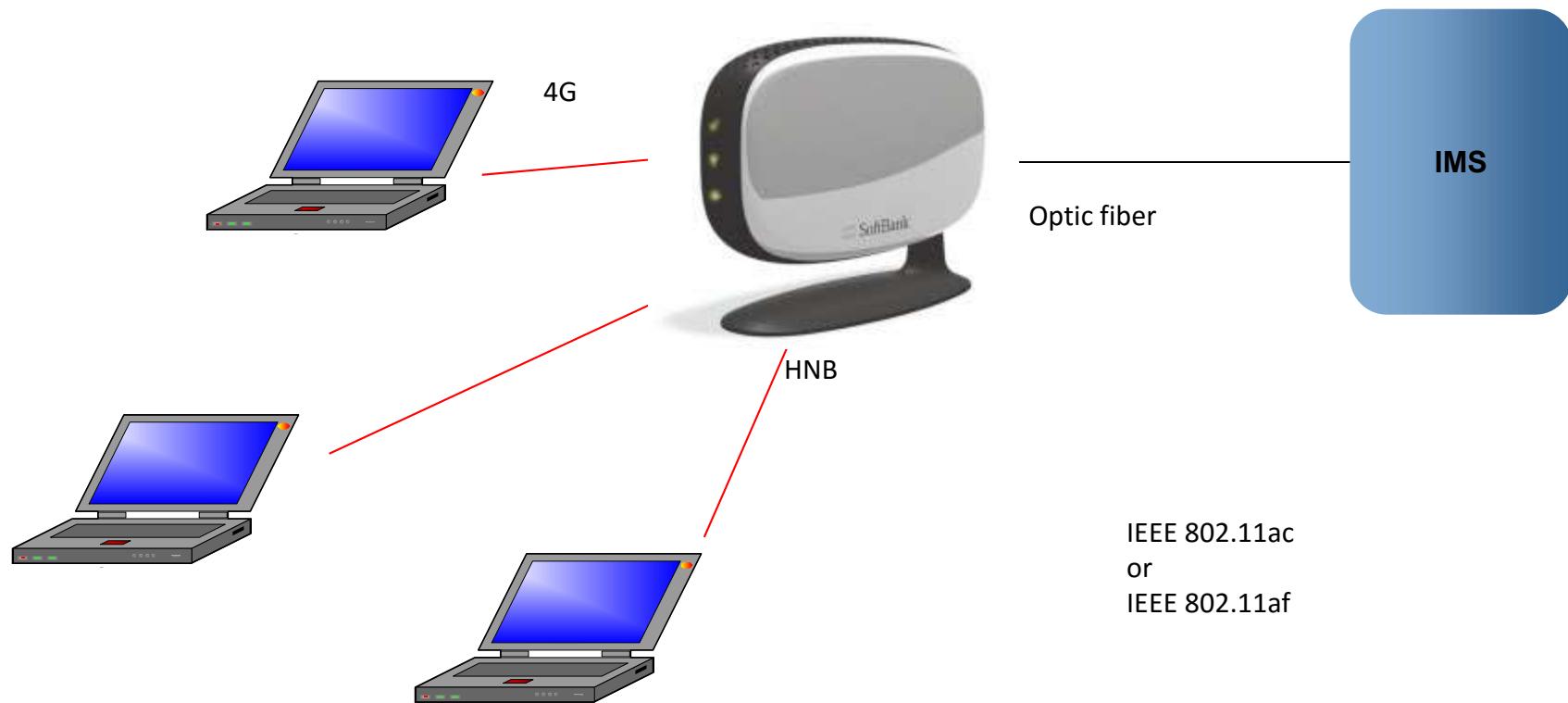
ADSL

**Core
network**

Unlicensed Mobile Access or UMA

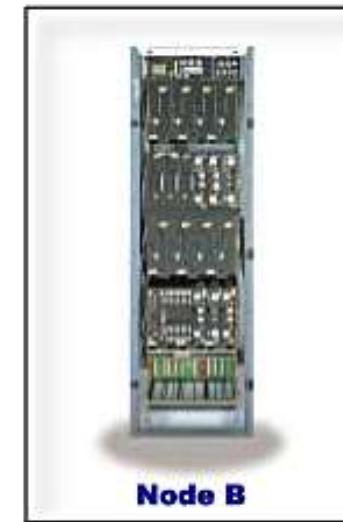
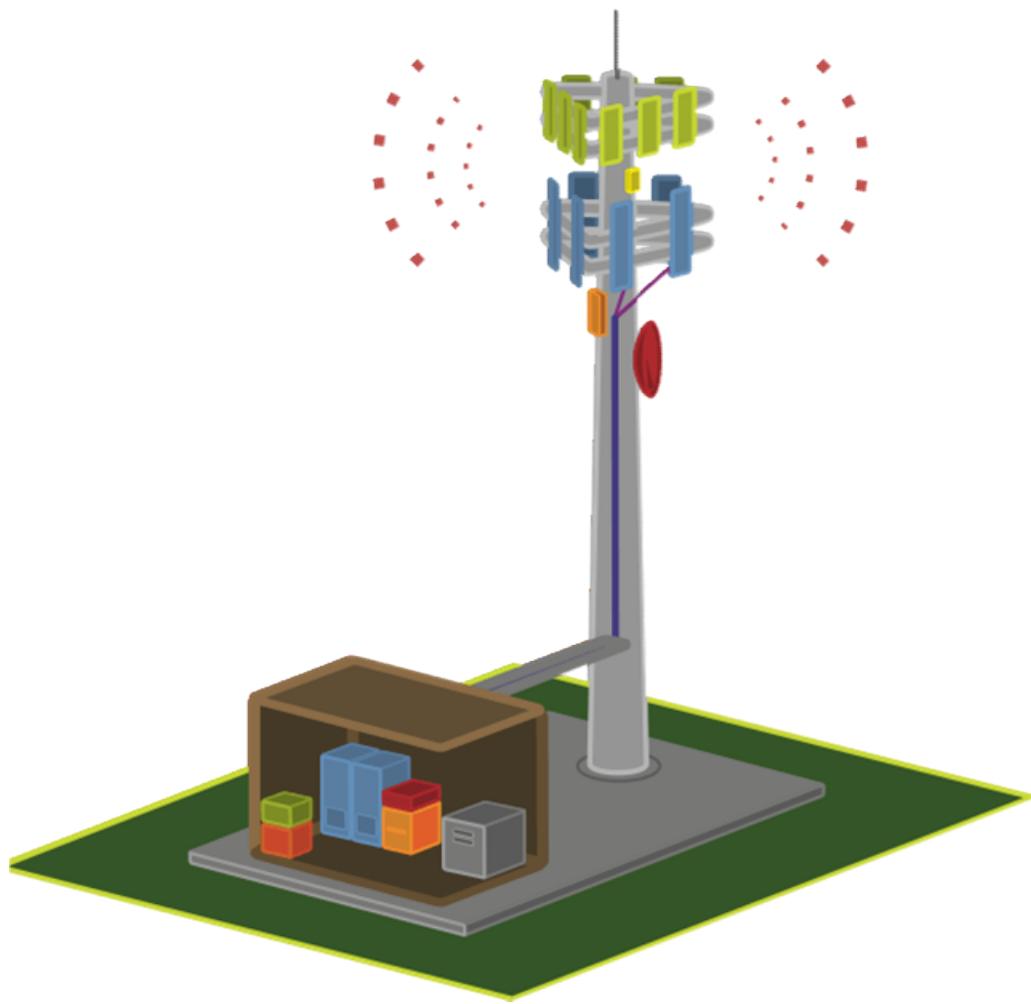
Commercial name for 3GPP: Generic Access Network or GAN standard.

Femtocell LTE/4G

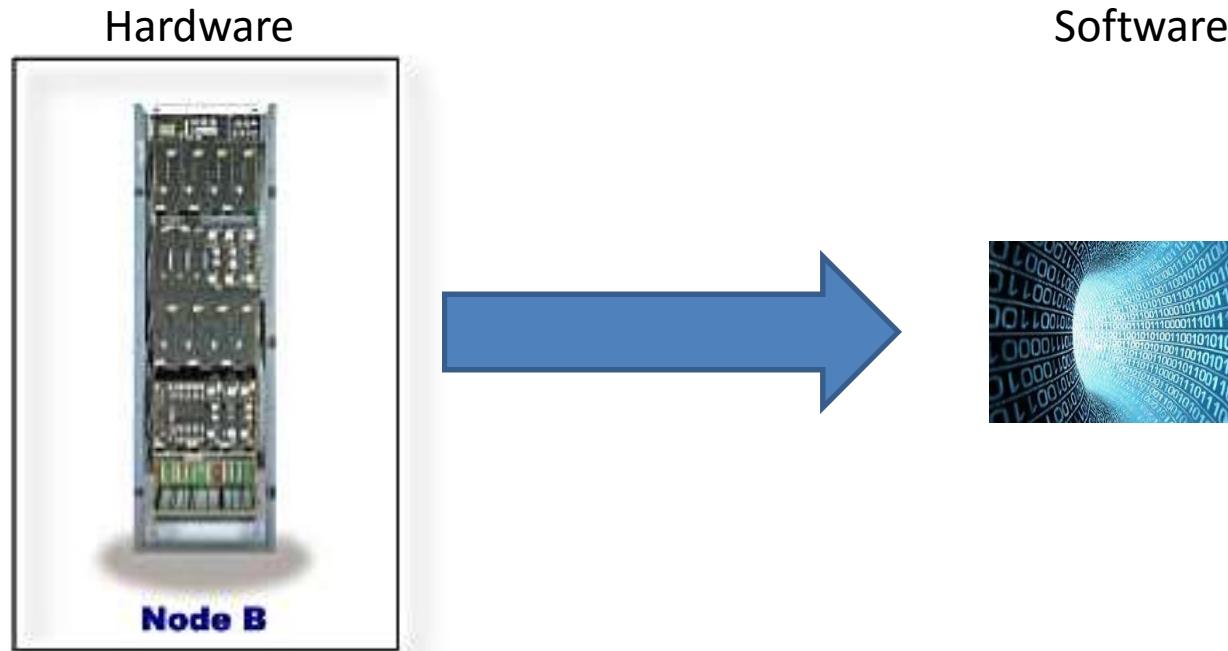


How to manage interferences between users
How to mutualize antenna

Virtualization



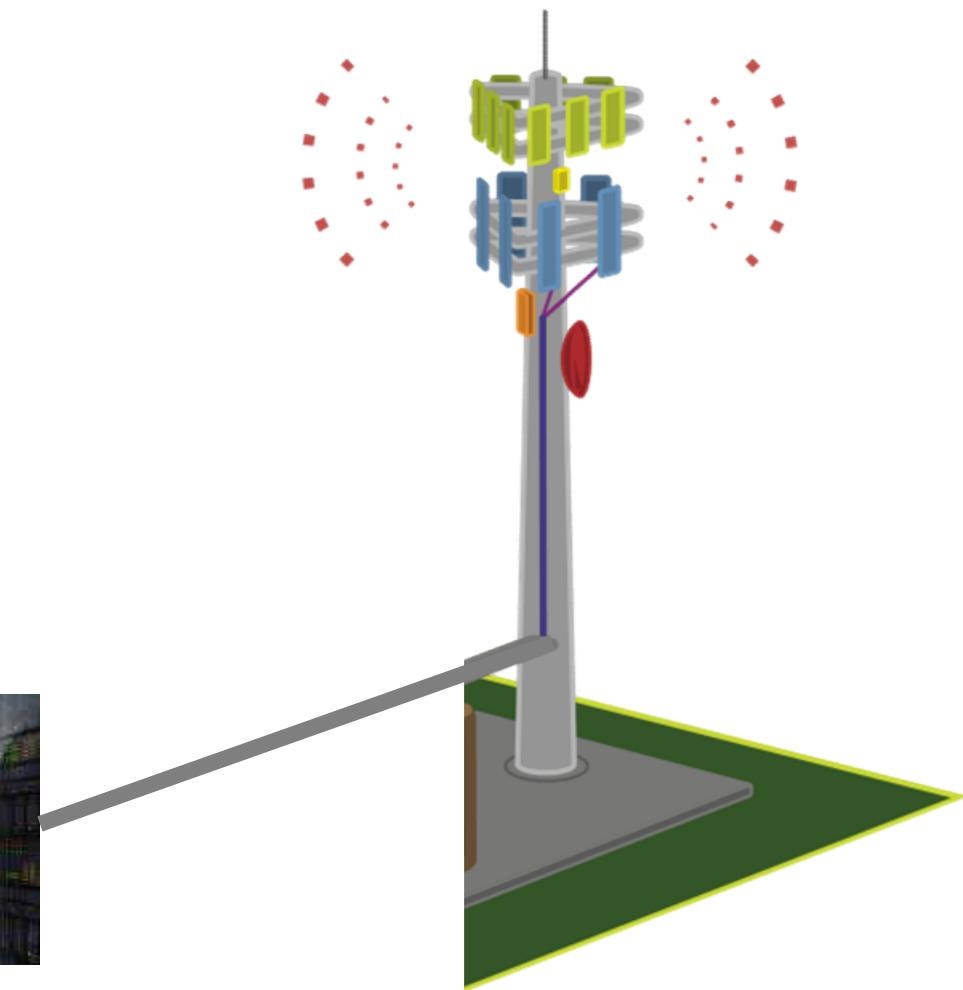
Virtualization



Virtual machine



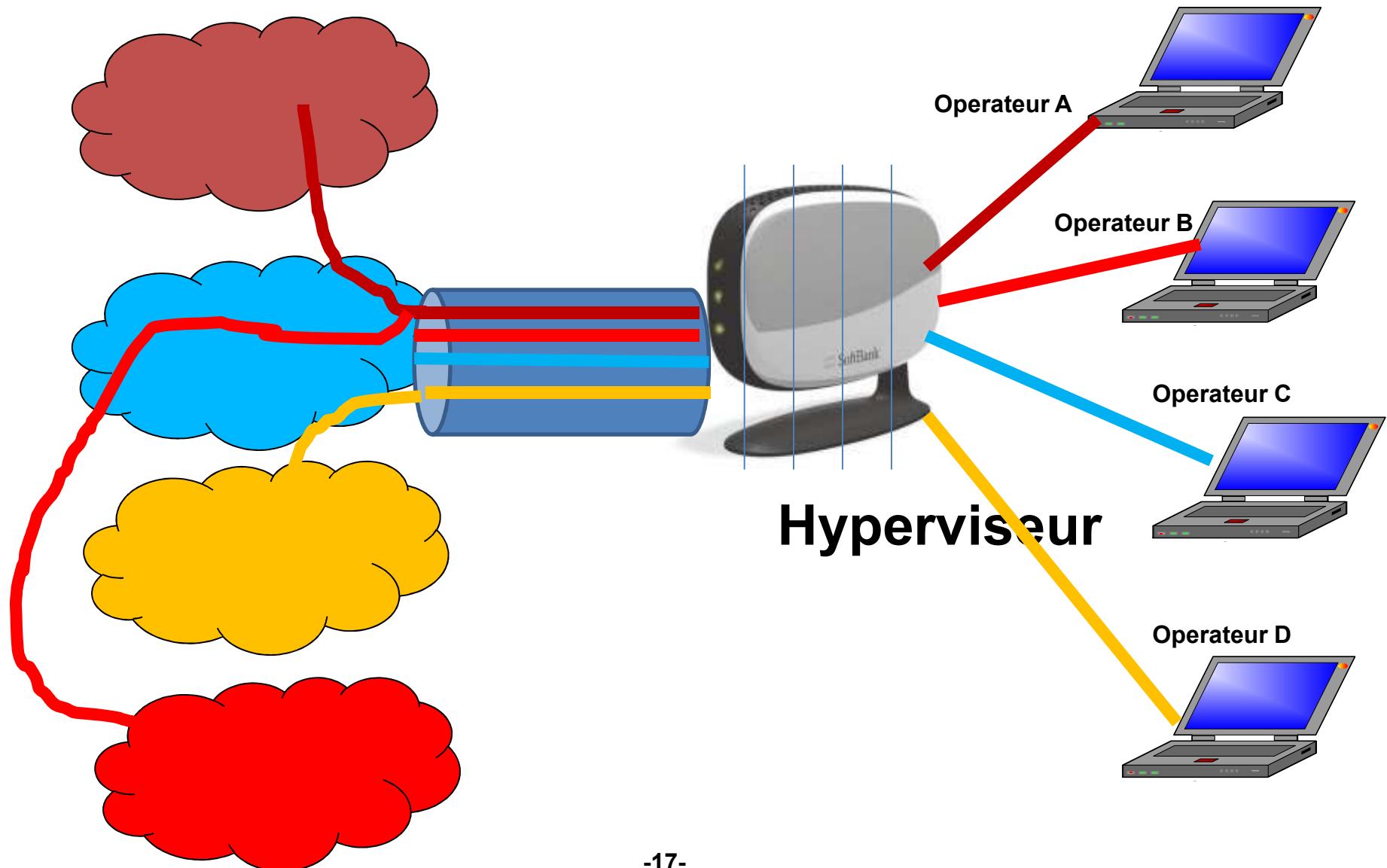
Virtual machine



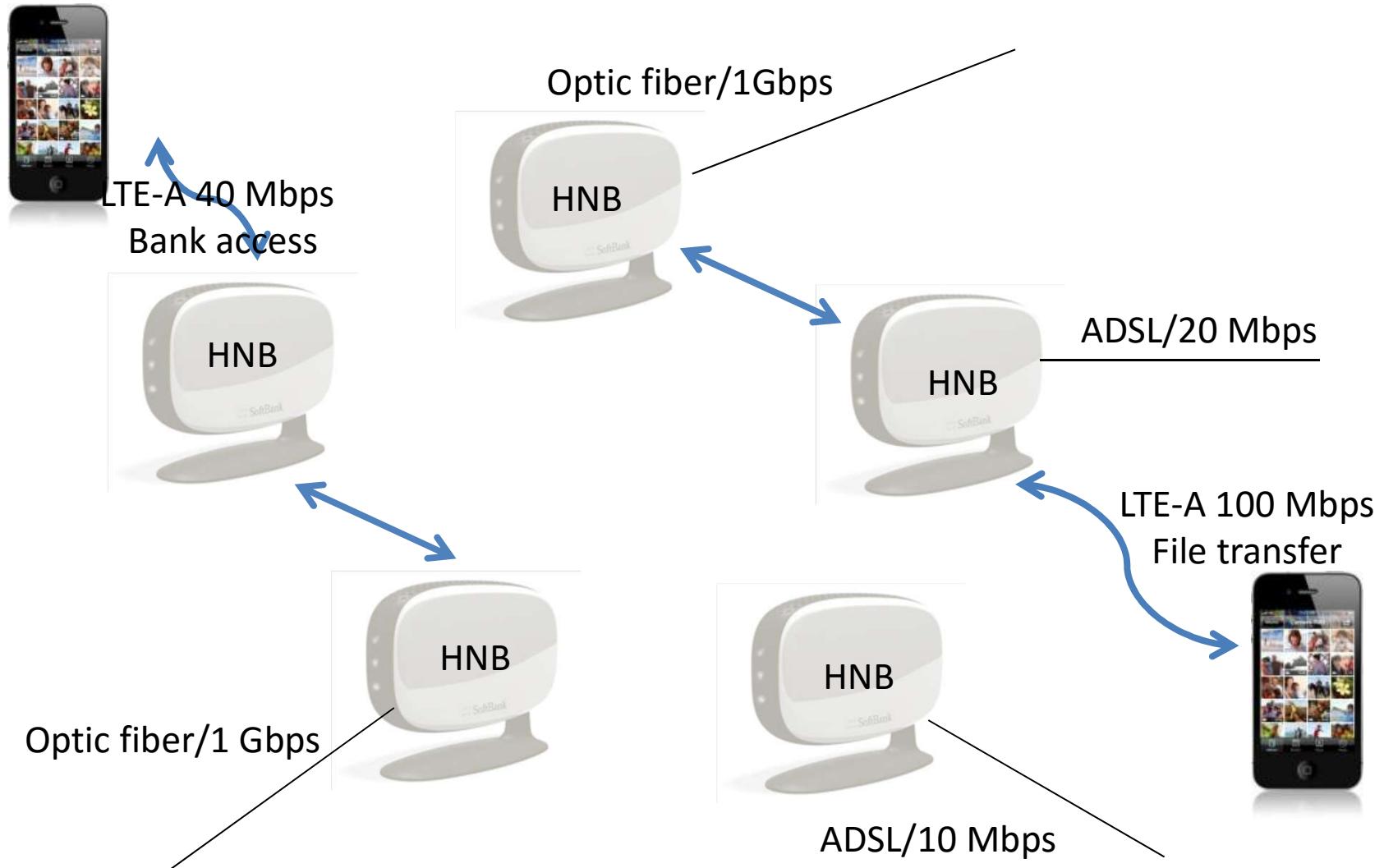
Point d'accès Wi-Fi virtuel



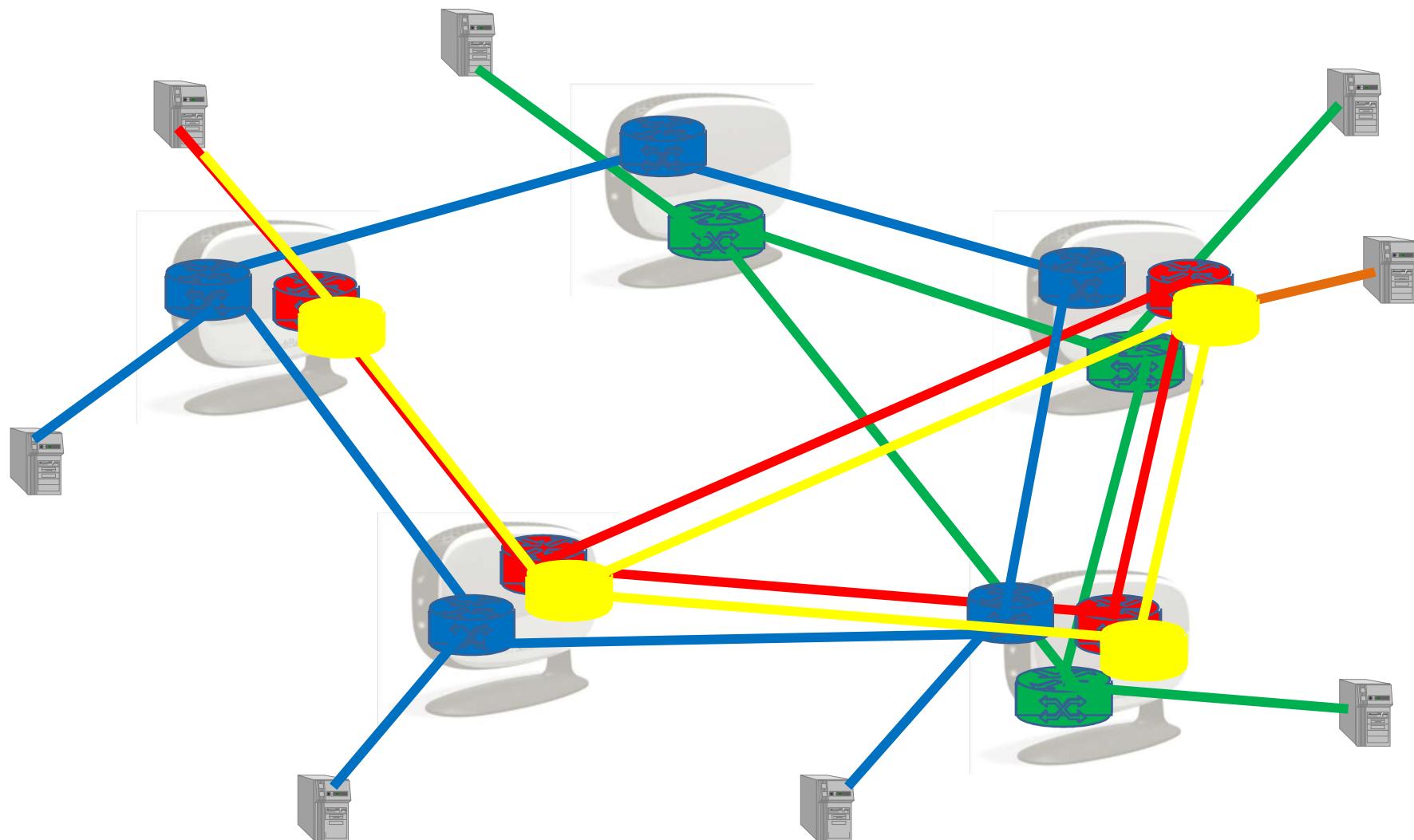
HNB virtualization



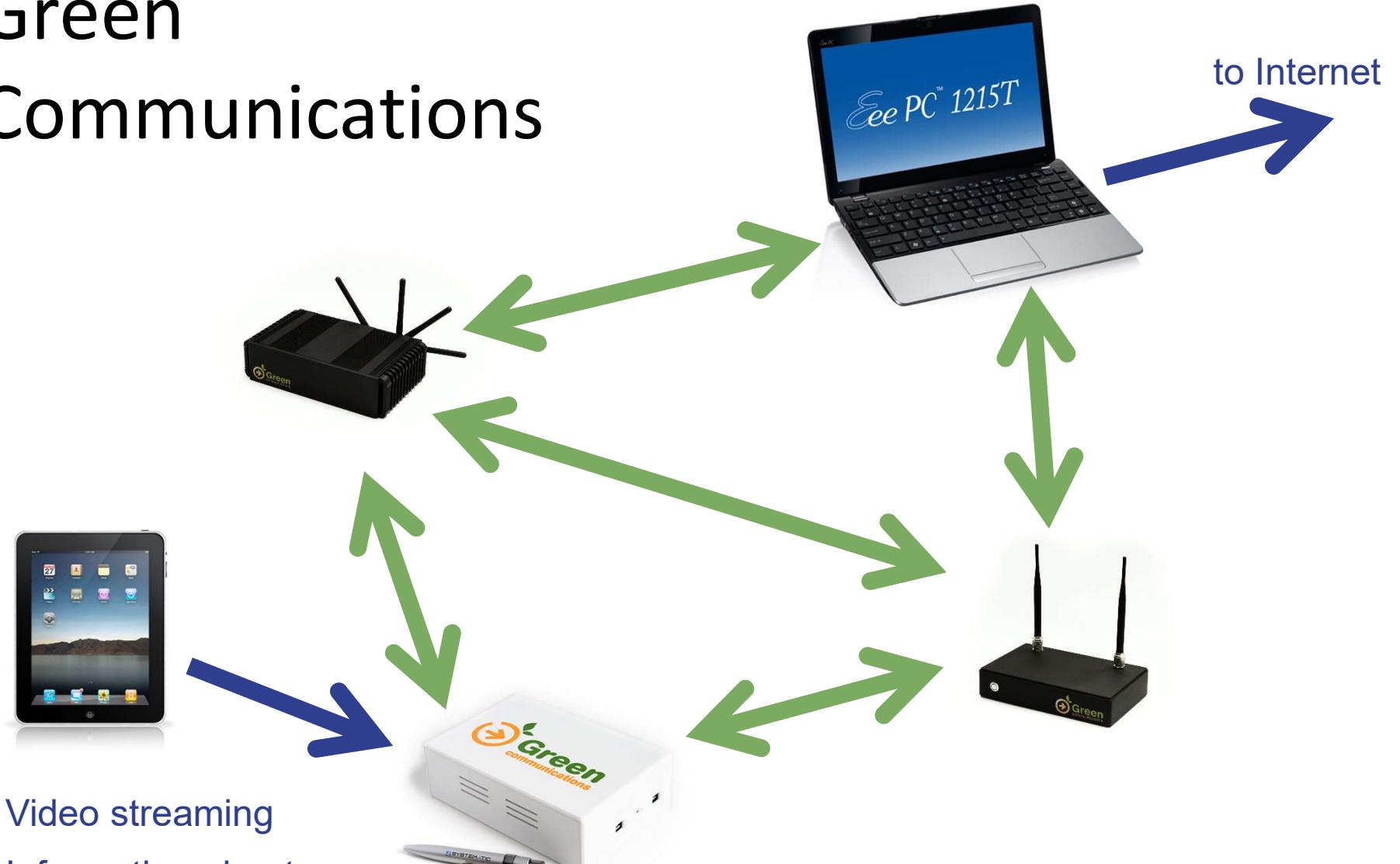
4G mesh femtocells



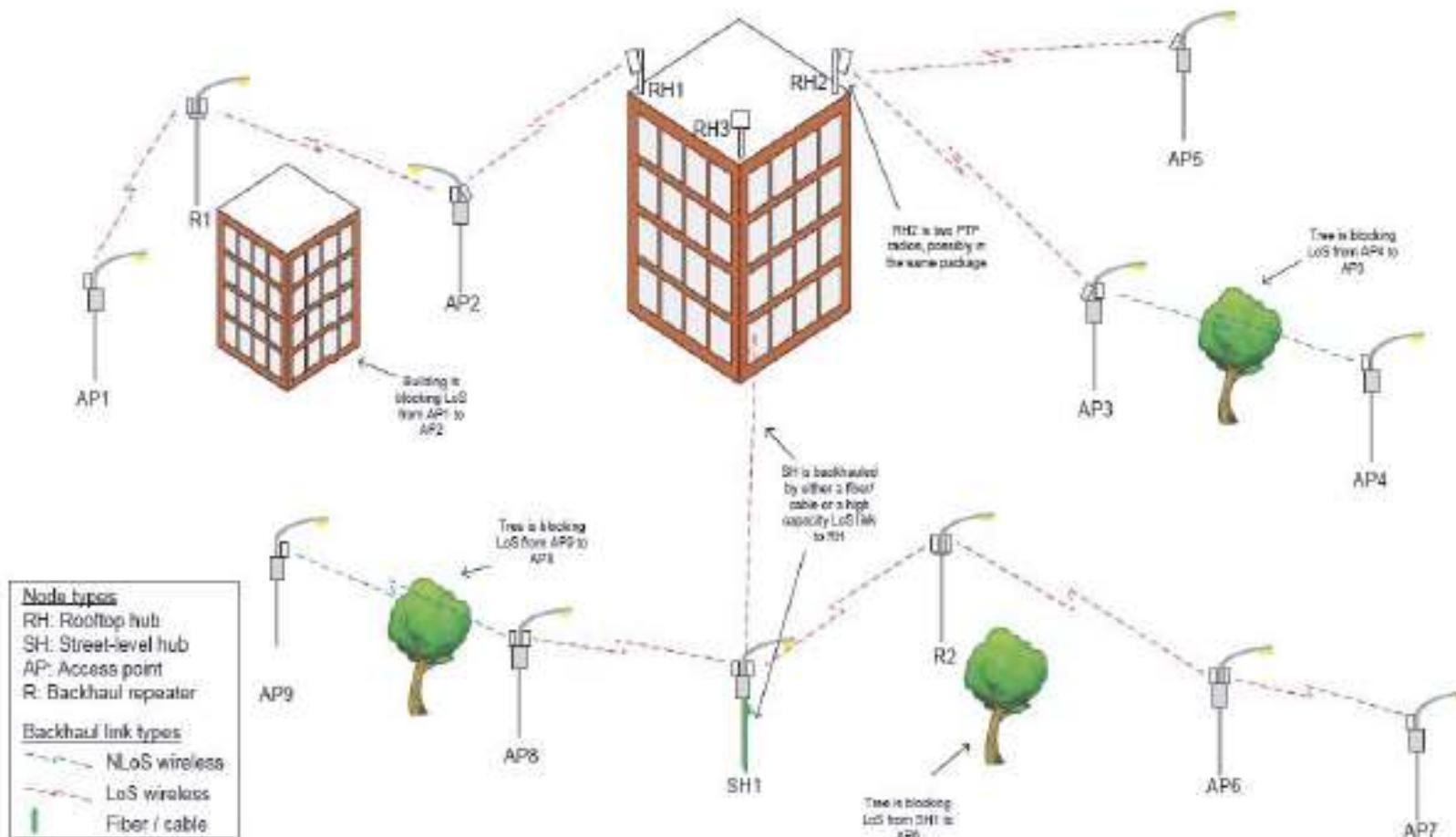
Virtual HNB Networks



Green Communications

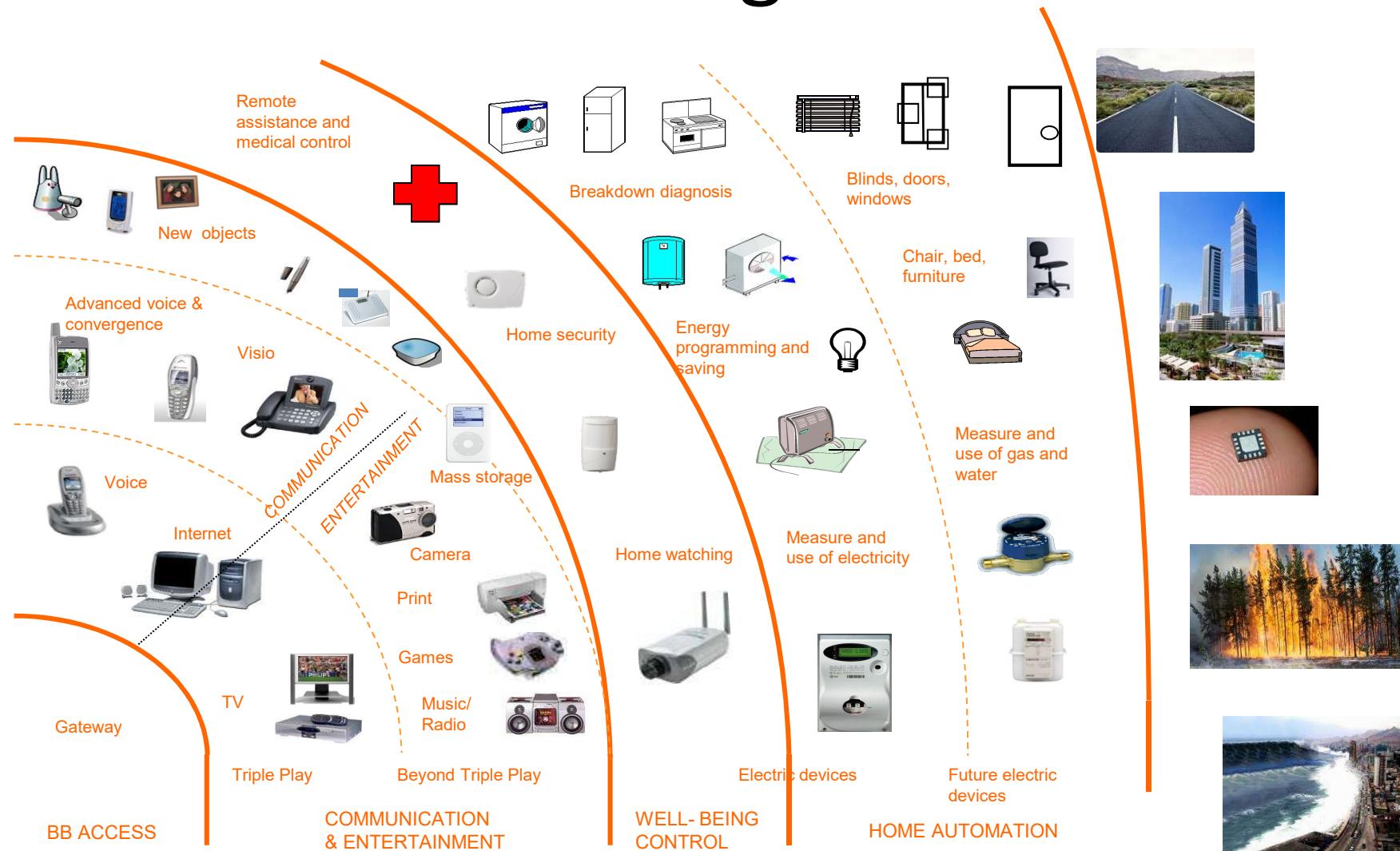


Small Cell Backhaul (SCB)



Internet des choses

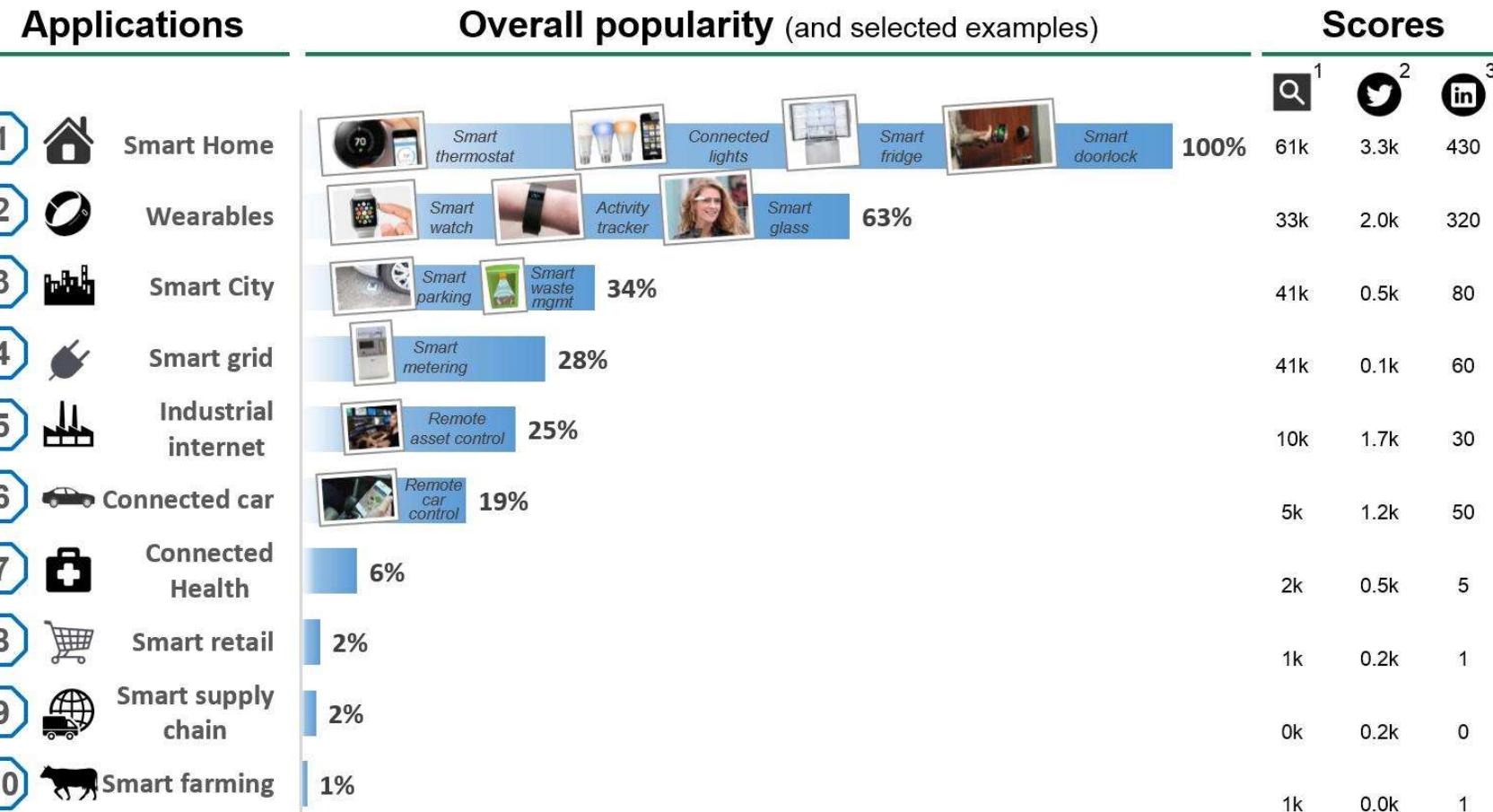
Things



Internet des choses



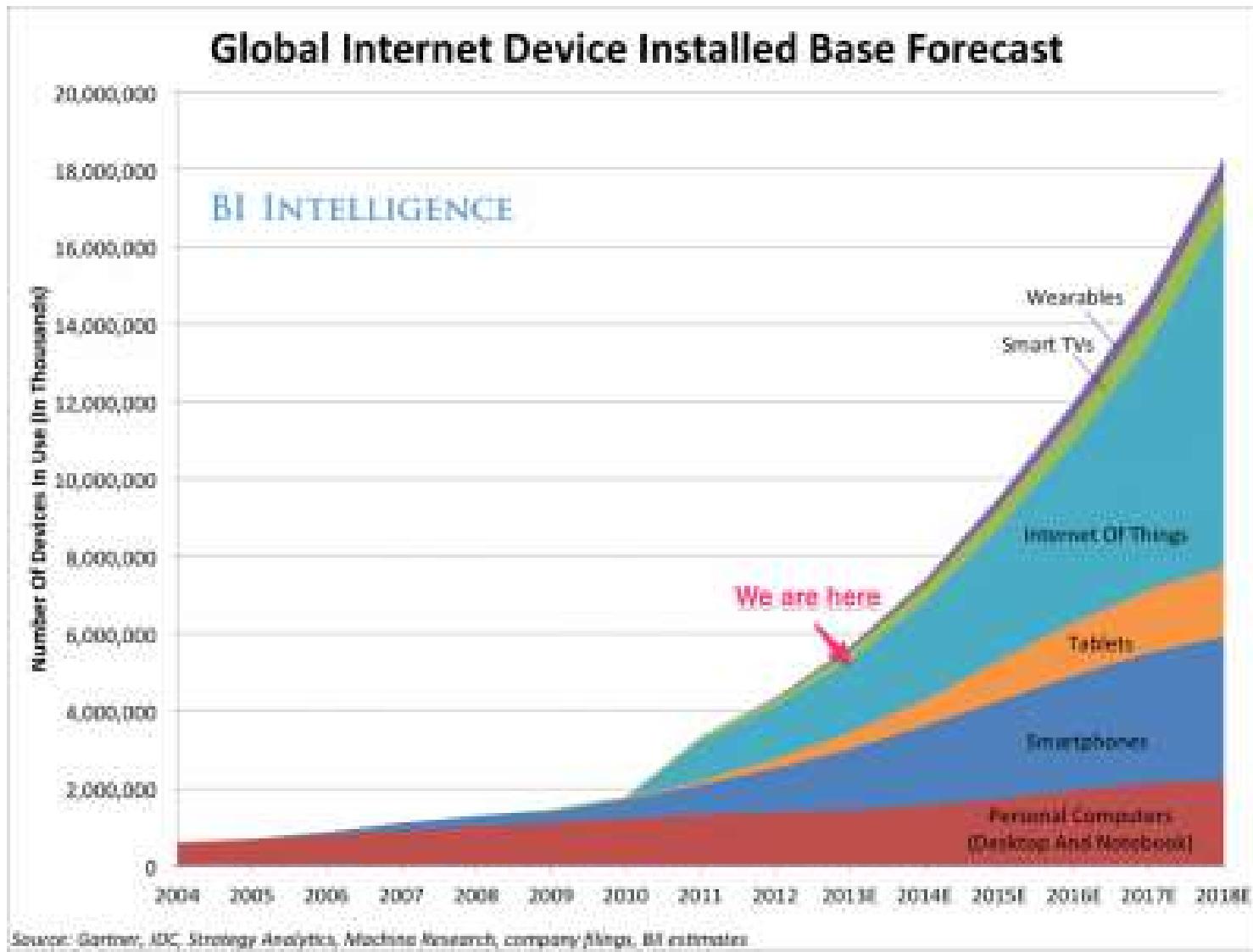
IoT Analytics – Quantifying the connected world



1. Monthly worldwide Google searches for the application 2. Monthly Tweets containing the application name and #IOT 3. Monthly LinkedIn Posts that include the application name. All metrics valid for Q4/2014.

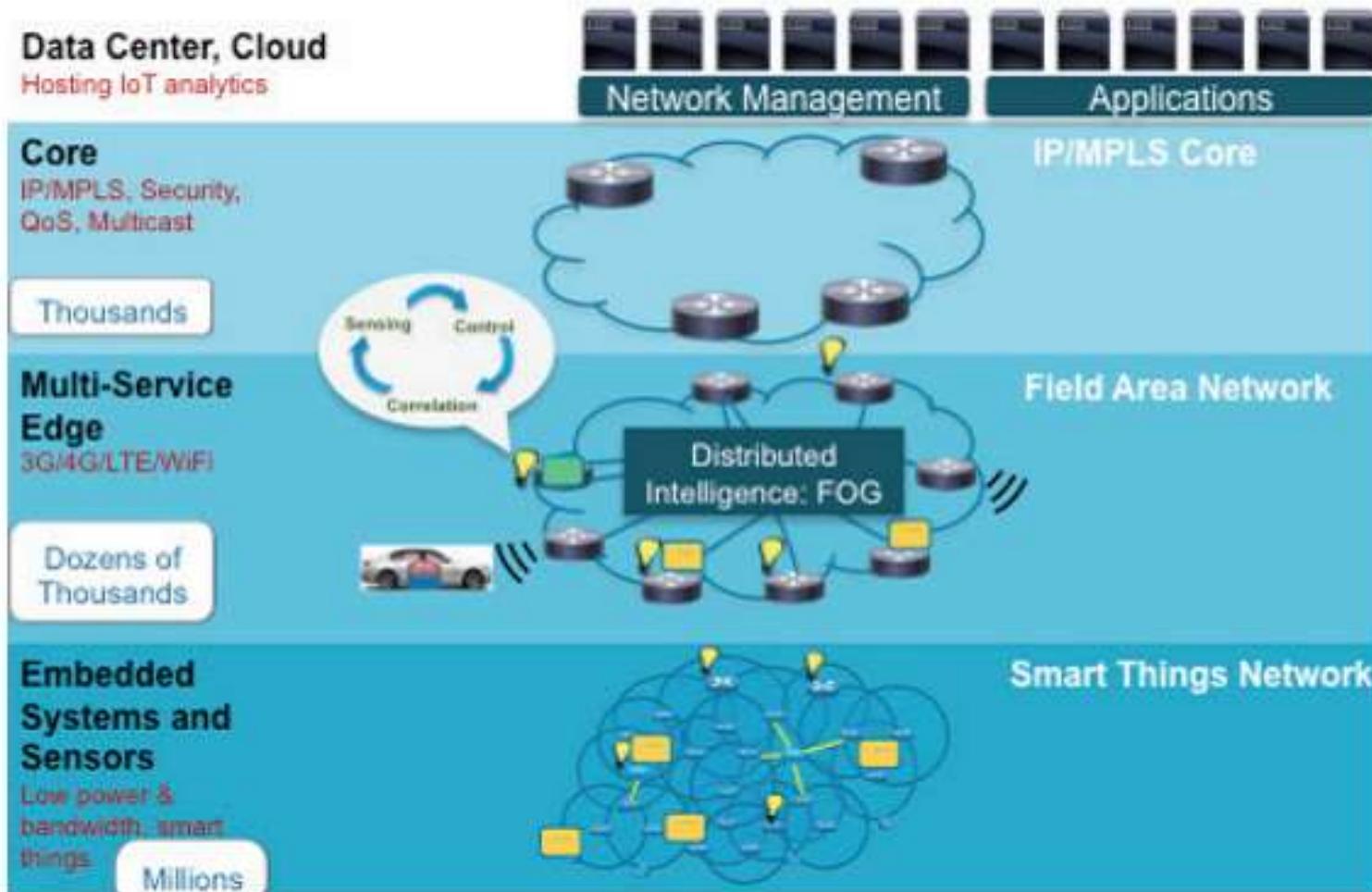
Sources: Google, Twitter, LinkedIn, IoT Analytics

Internet of Things



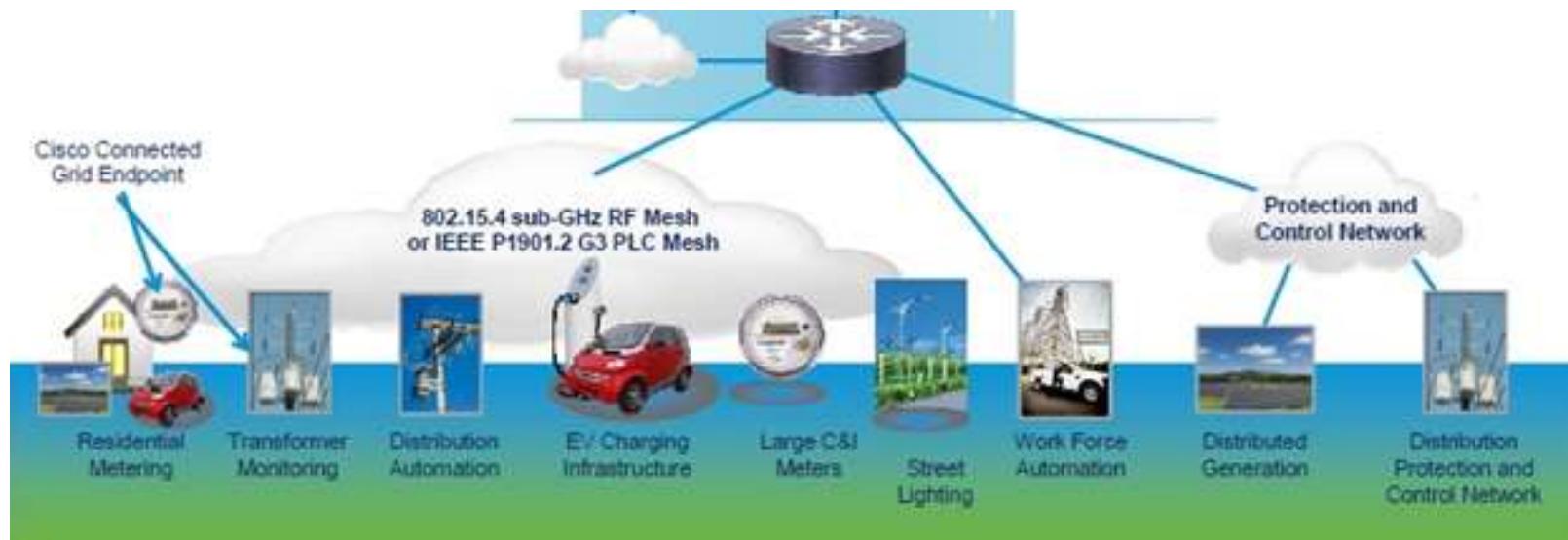
Fog networking

The Internet of Thing Architecture and Fog Computing



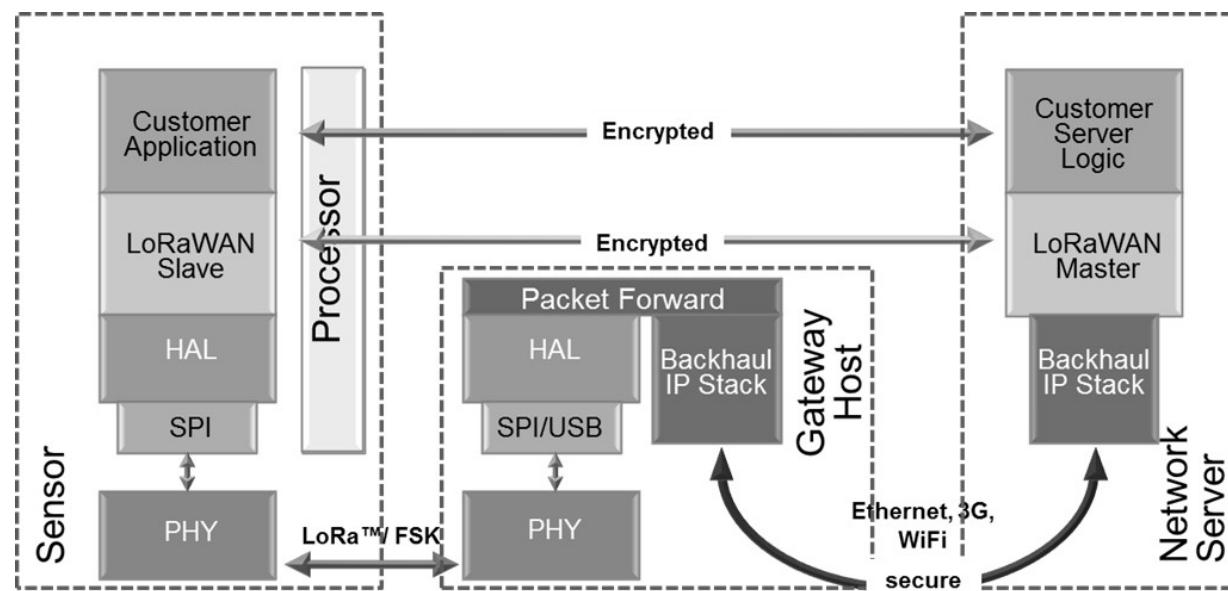
Fog networking

- Le Fog Networking is a Cloud extension to the edge

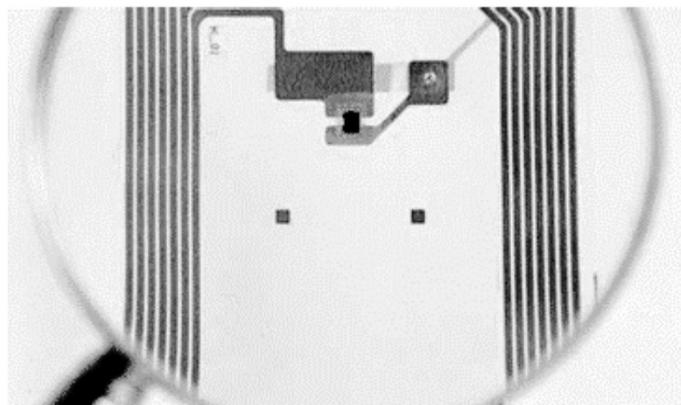


Internet of things

- Specific networks: example SigFox
- 802.11ah network
- Telco (telecommunication operator)
 - LoRA



RFID



Passif



Actif

Fréquences pour les RFID

Fréquence pour les RFID	Commentaire
125 KHz (LF)	Première solution permettant une portée relativement importante pour les RFID passifs
13,56 MHz (HF)	Une des fréquences standardisées très utilisée pour les RFID passifs
400 MHz	Quelques utilisations spécifiques, comme la détection des voitures volées
865-868 MHz (UHF)	Bande de fréquences en Europe pour une utilisation intensive des RFID
902-928 MHz (UHF)	Bande de fréquences normalisée pour l'Amérique du Nord
2,4-2,4835 GHz	Bande libre ISM dans laquelle devraient se développer de nombreuses applications RFID

EPC type 1 et 2

Code de produit électronique de Type 1			
8 bits	EPC Manager 28 bits	Classe de l'objet 24 bits	Numéro de série 36 bits

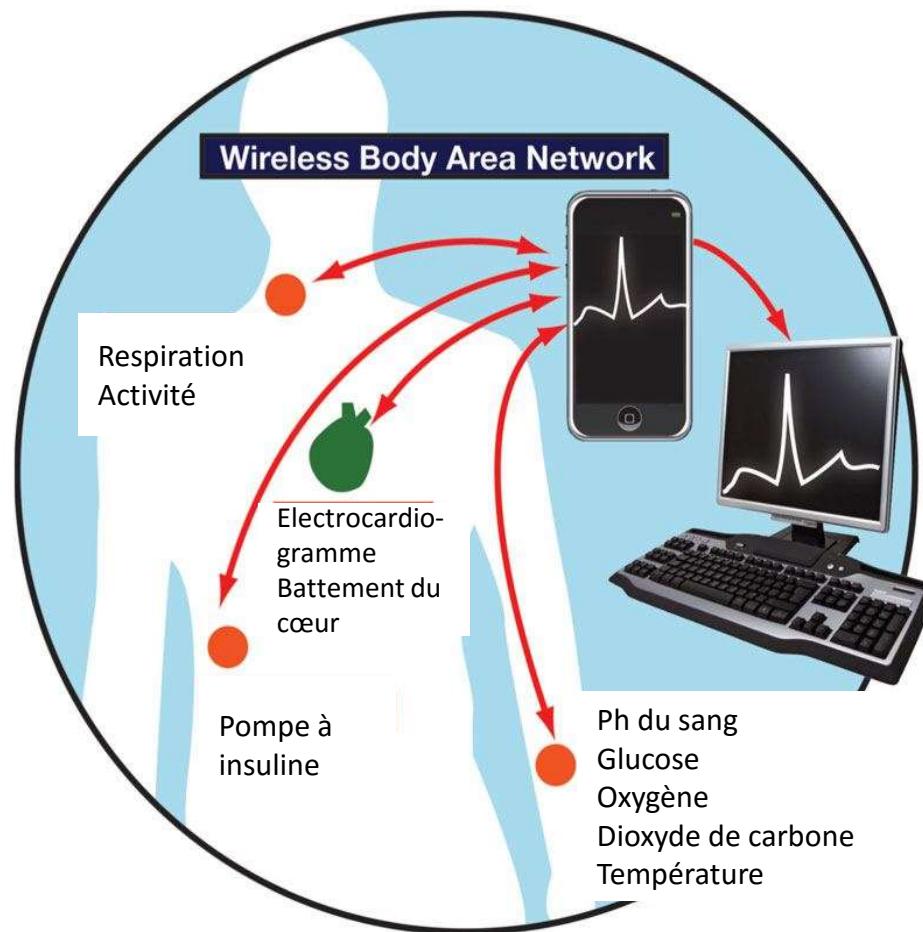
En-tête

Code de produit électronique de Type 2					
8 bits	3 bits	3 bits	Préfixe de la compagnie de 20 à 40 bits	Référence de l'objet de 24 à 40 bits	Numéro de série 140 bits
En-tête	Valeur	Partition du filtre			

Smart dust

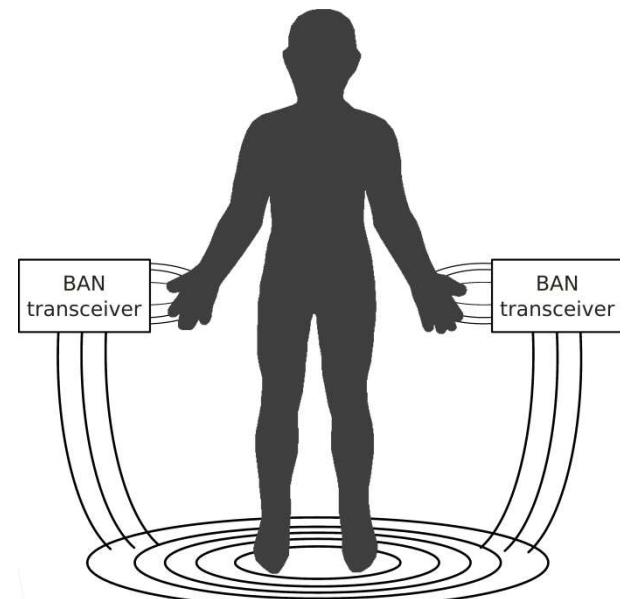
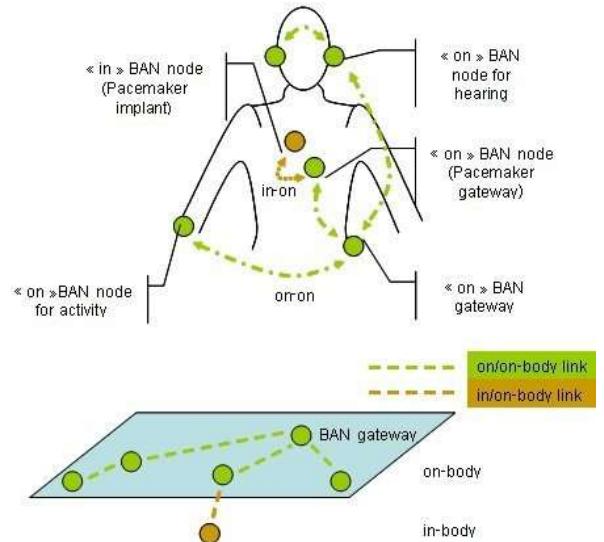


Medical thing



Medical sensor

- Strong development for medical sensor
- BAN: Body Area Networks
 - FCC approved
 - A 40 MHz band for BANs with a very low energy consumption
 - A specific band 2360-2400MHz
 - Standard for the working group IEEE 802.15.6

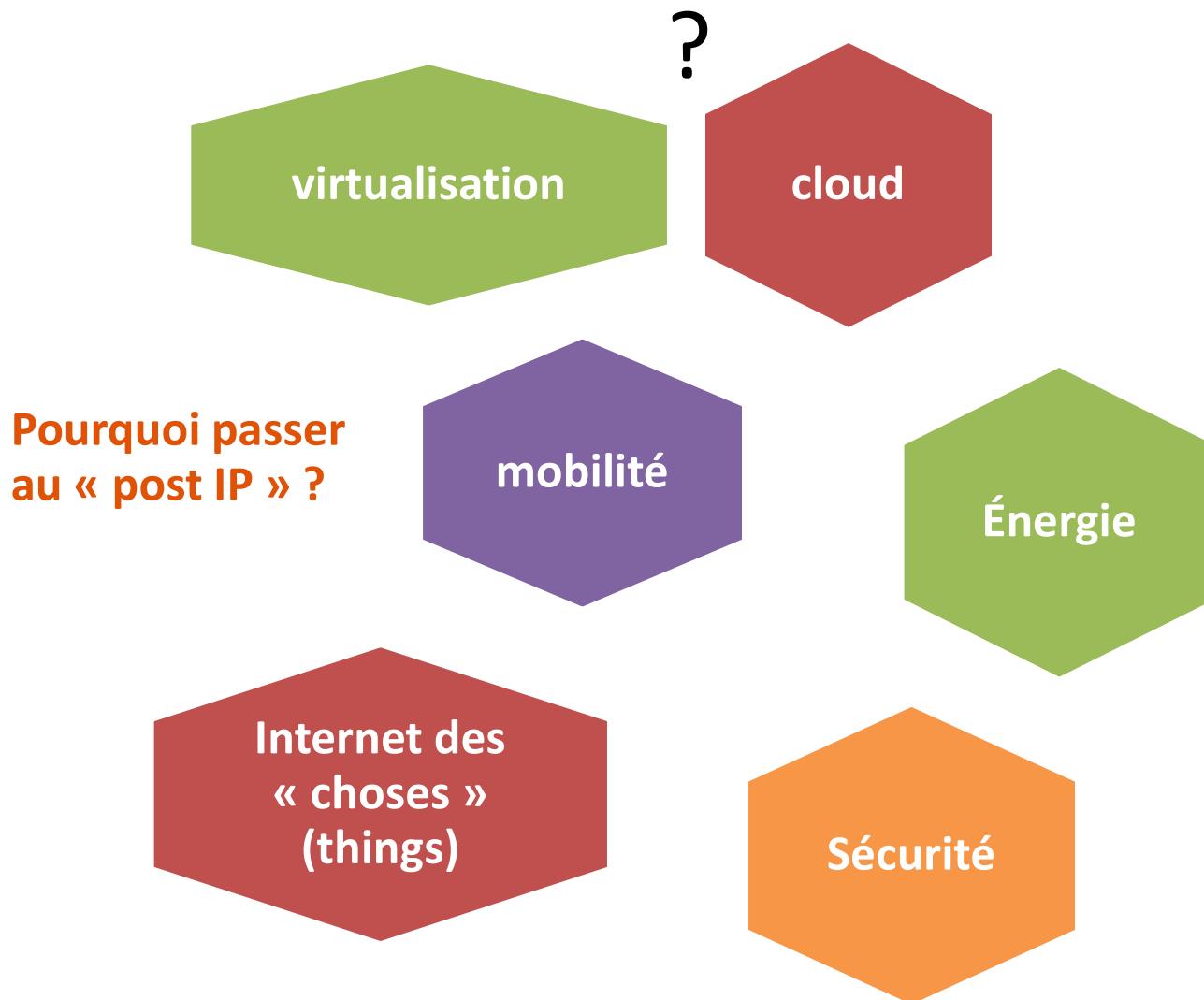


IEEE 802.15.6

- IEEE 802.15.6
 - 402-405 MHz (In – In – Out)
 - Ultra Wideband (UWB), which operates at 2.4 GHz and in the 3.1-10.6 GHz frequency band (Out – Out)
 - Entre 15 et 50 MHz for internal communications
 - Human Body Communications (HBC). HBC is working at 13.5, 400, 600, et 900 MHz (communication at the surface of the skin)

La génération Cloud

Pourquoi inventer un nouveau réseau



Que faire ?

Partir de rien : « clean slate approach »

ou améliorer le monde IP ?

ou « cloudifier »?

Consommer moins

Implémenter une intelligence collective

Tenir compte des milliards de « choses »

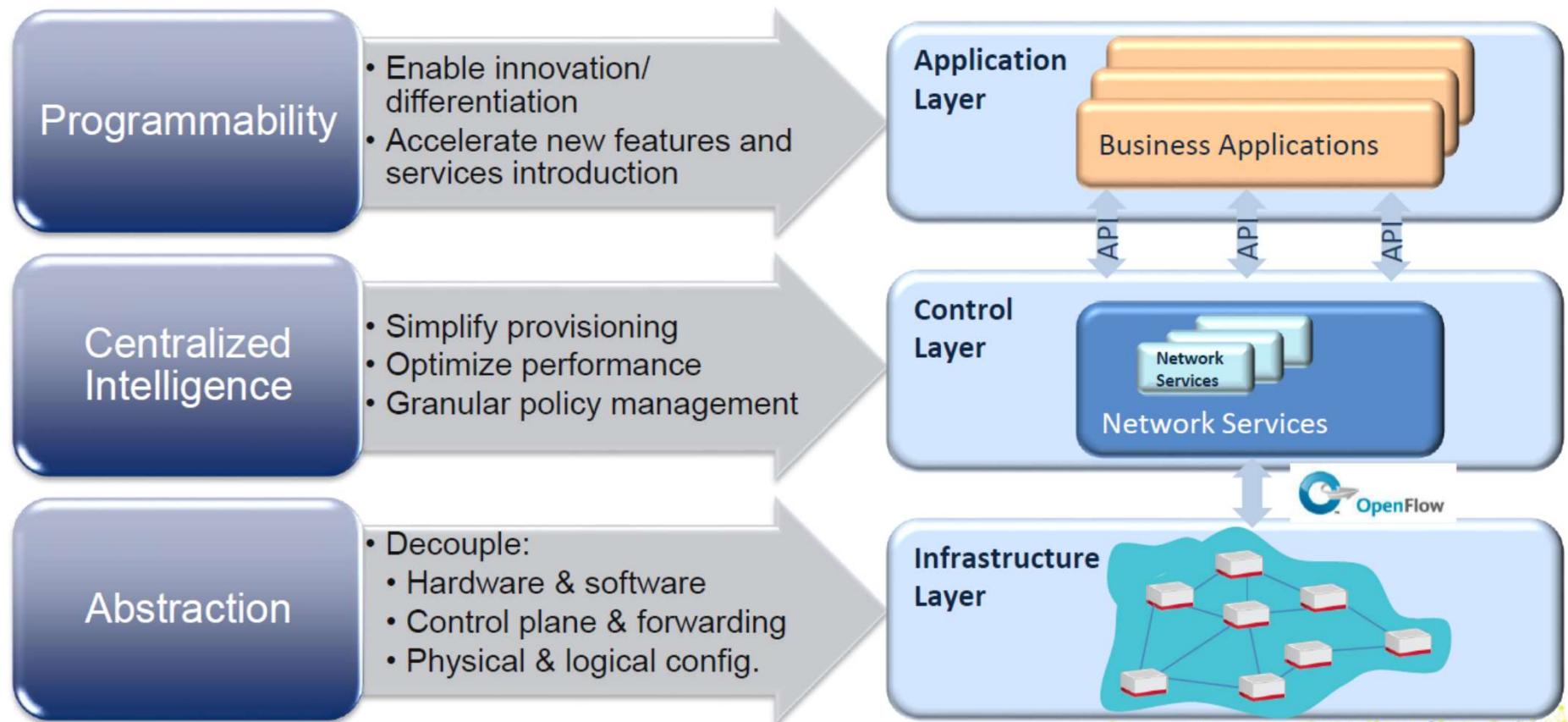
Virtualiser les ressources

Utiliser le sans fil

Sécuriser

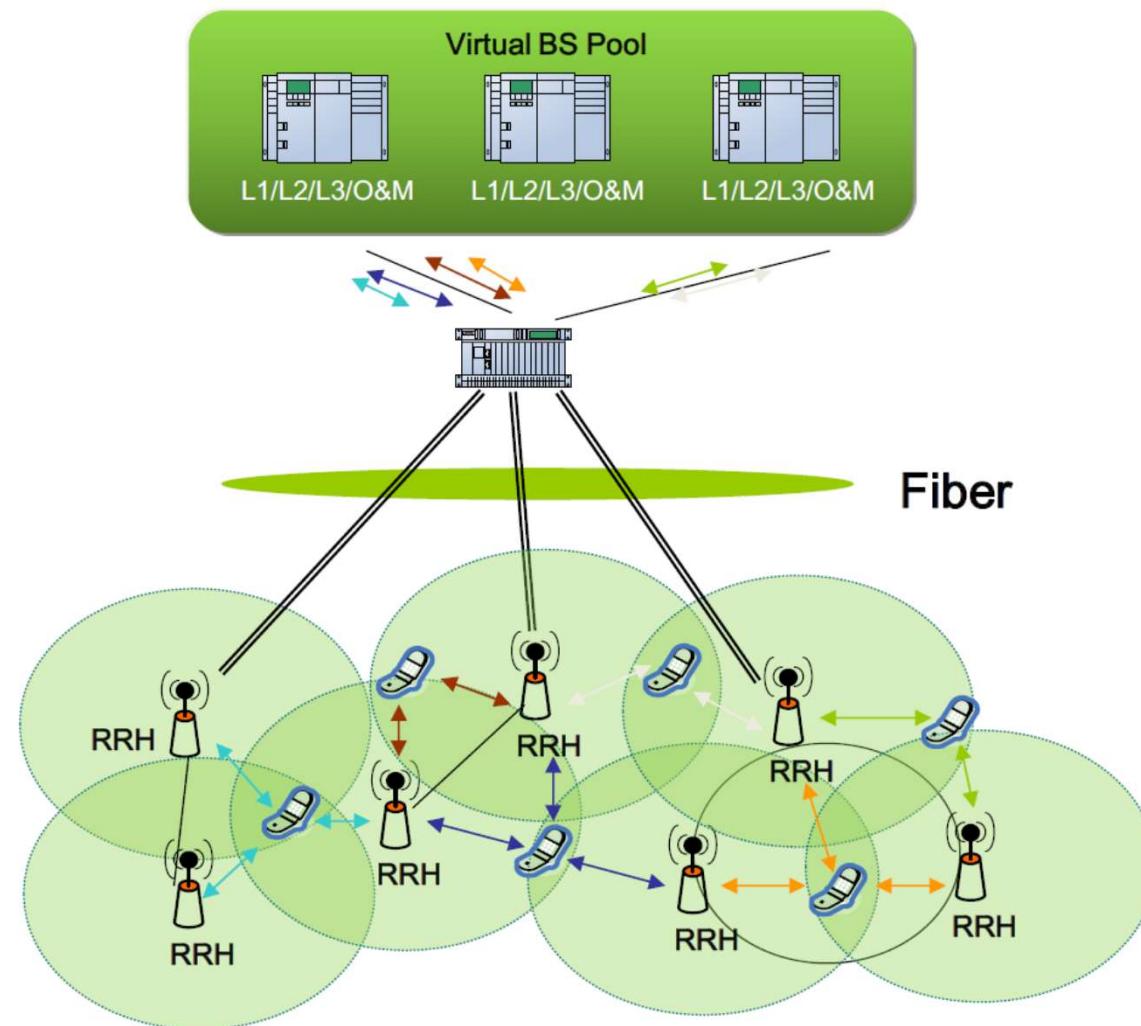
Cloudifier

ONF (Open Network Foundation)



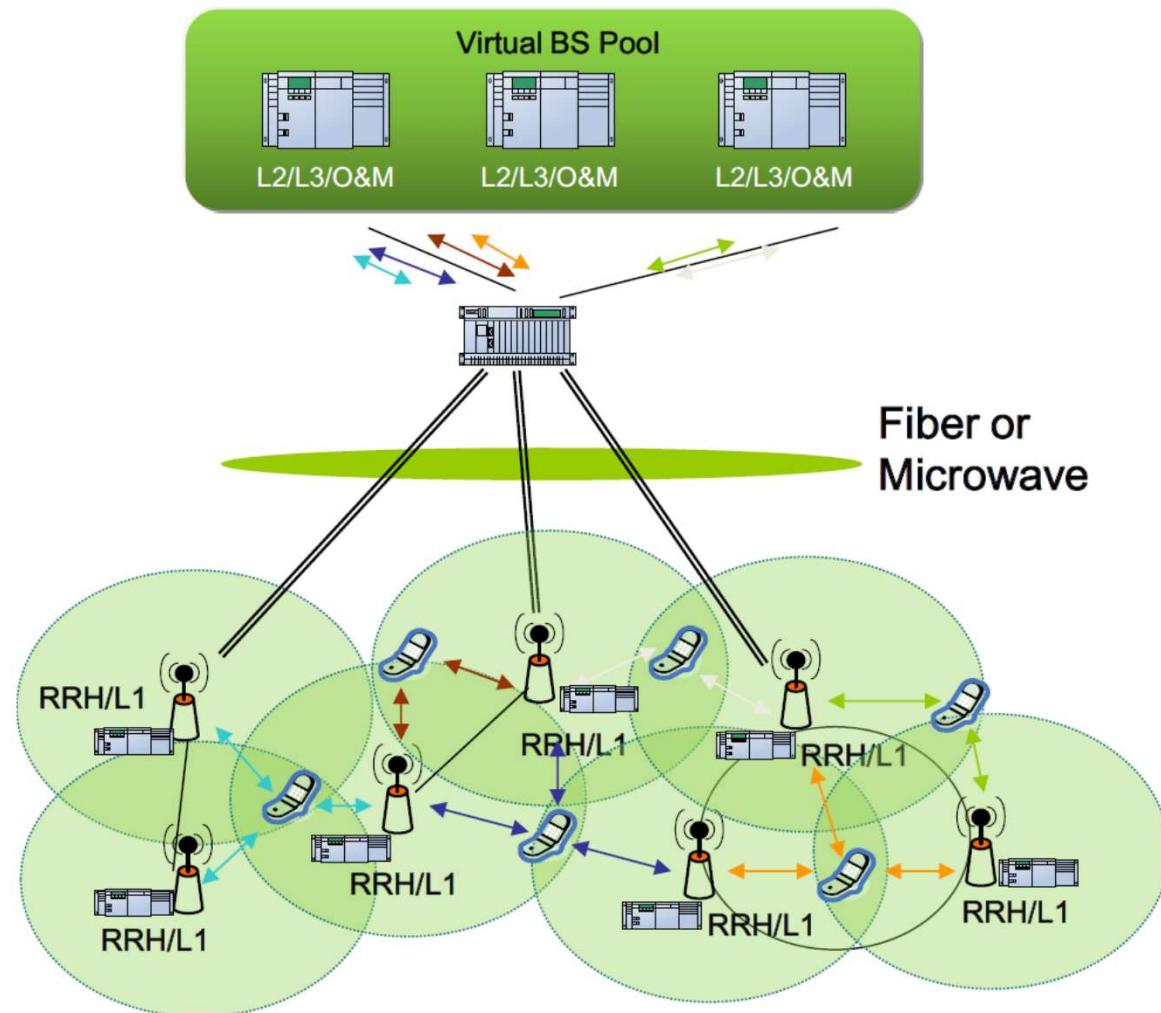
La 5G et la virtualisation

C-RAN



Fully centralized solution

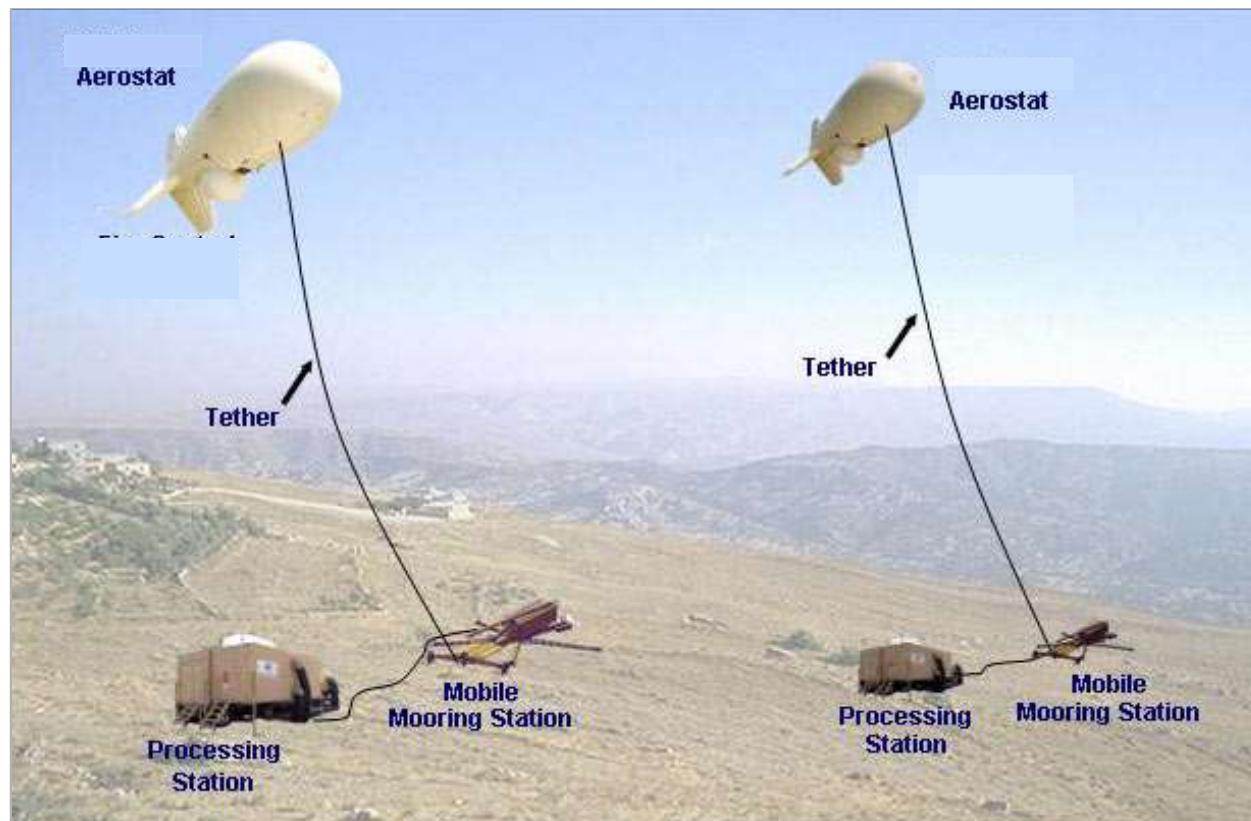
C-RAN



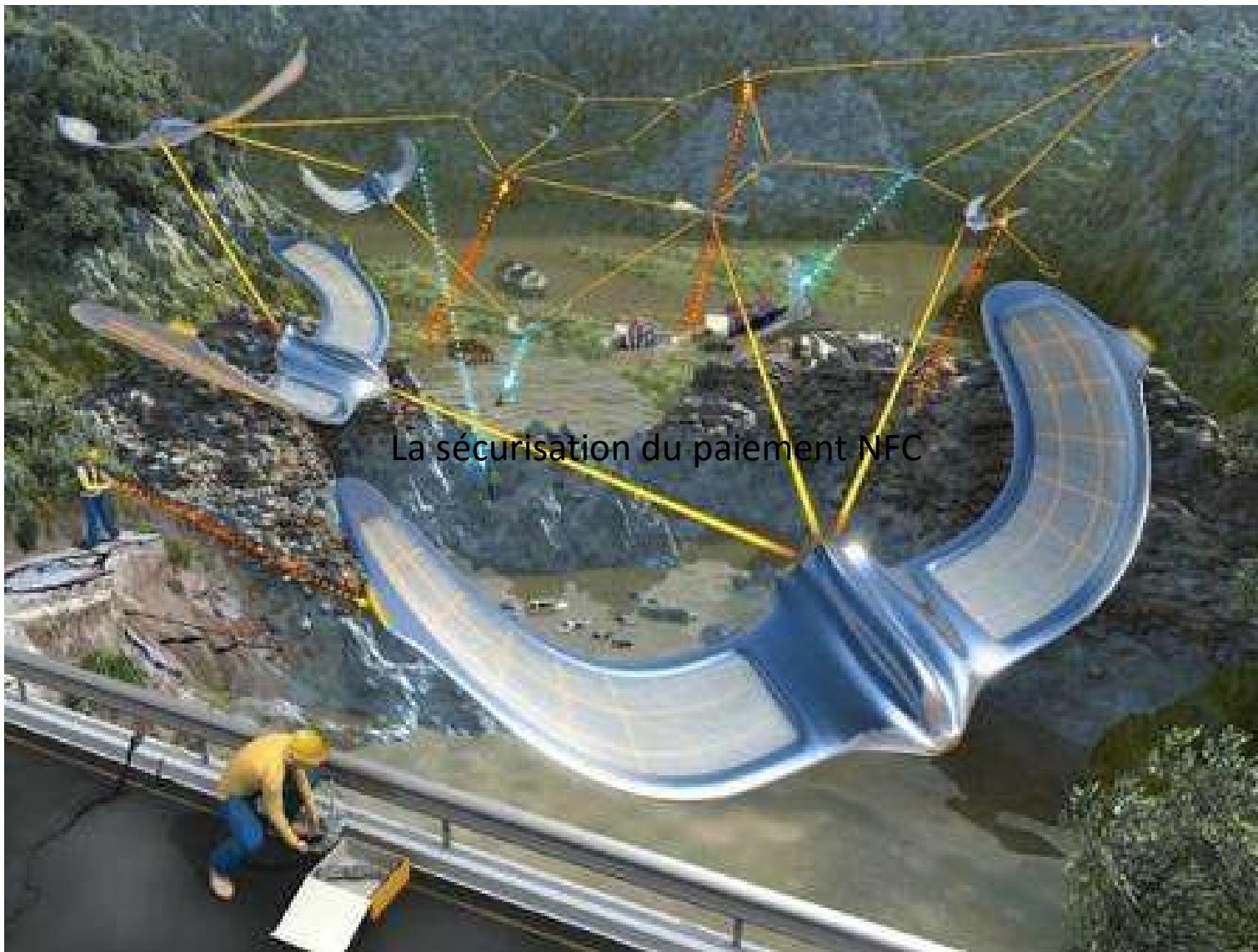
Partial centralized solution

5G

5G LAP (Low Altitude Platform)

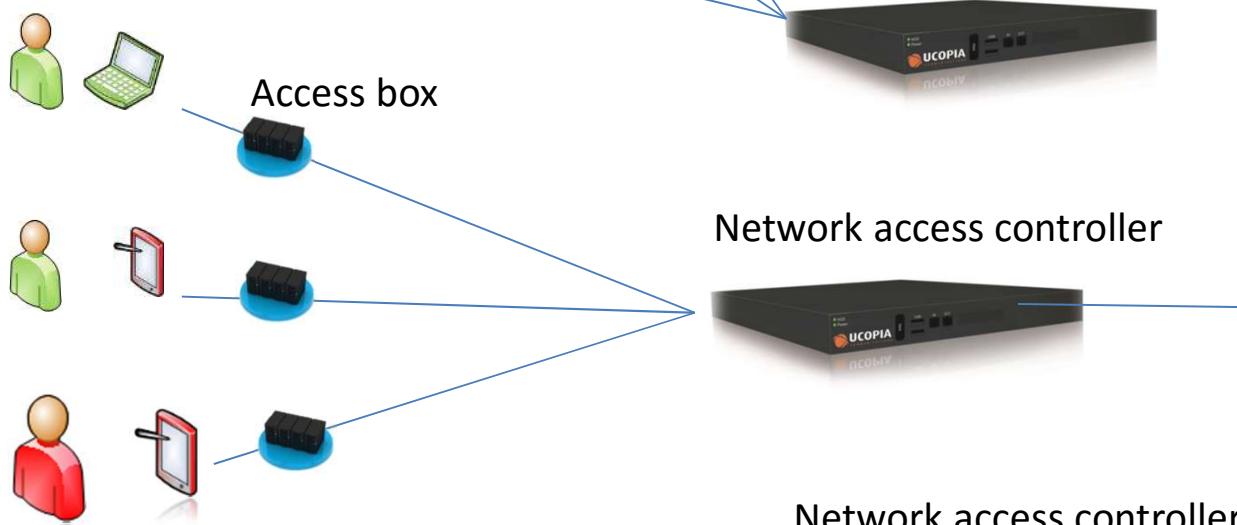
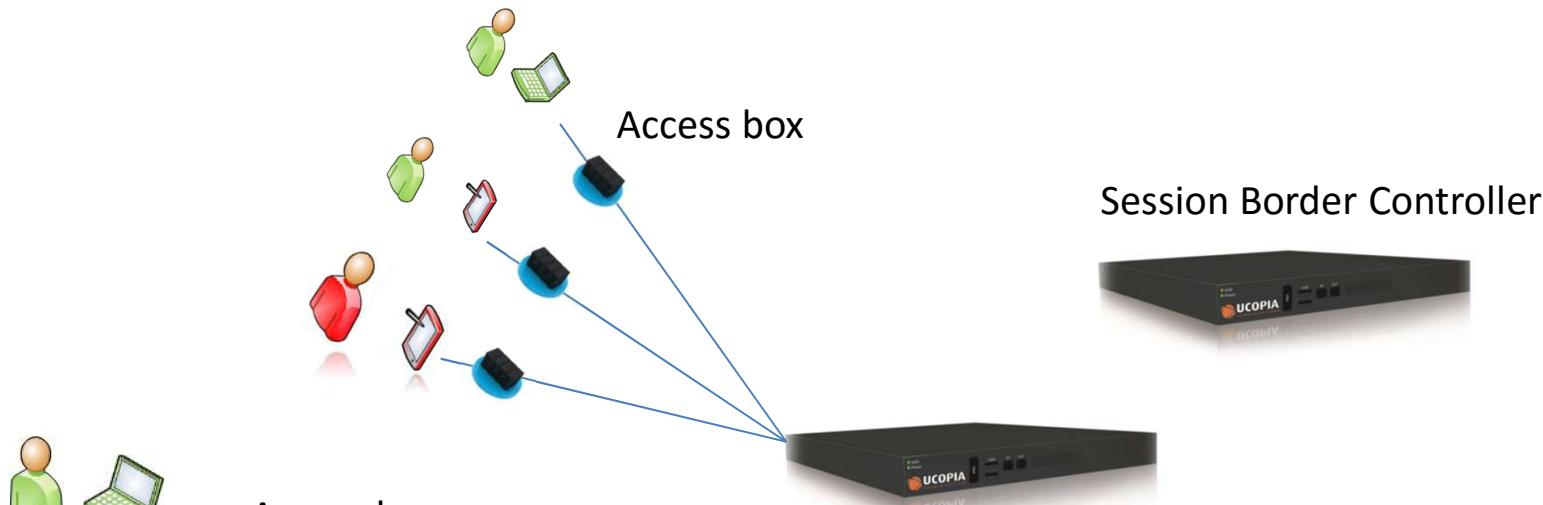


5G LAP (Low Altitude Platform)

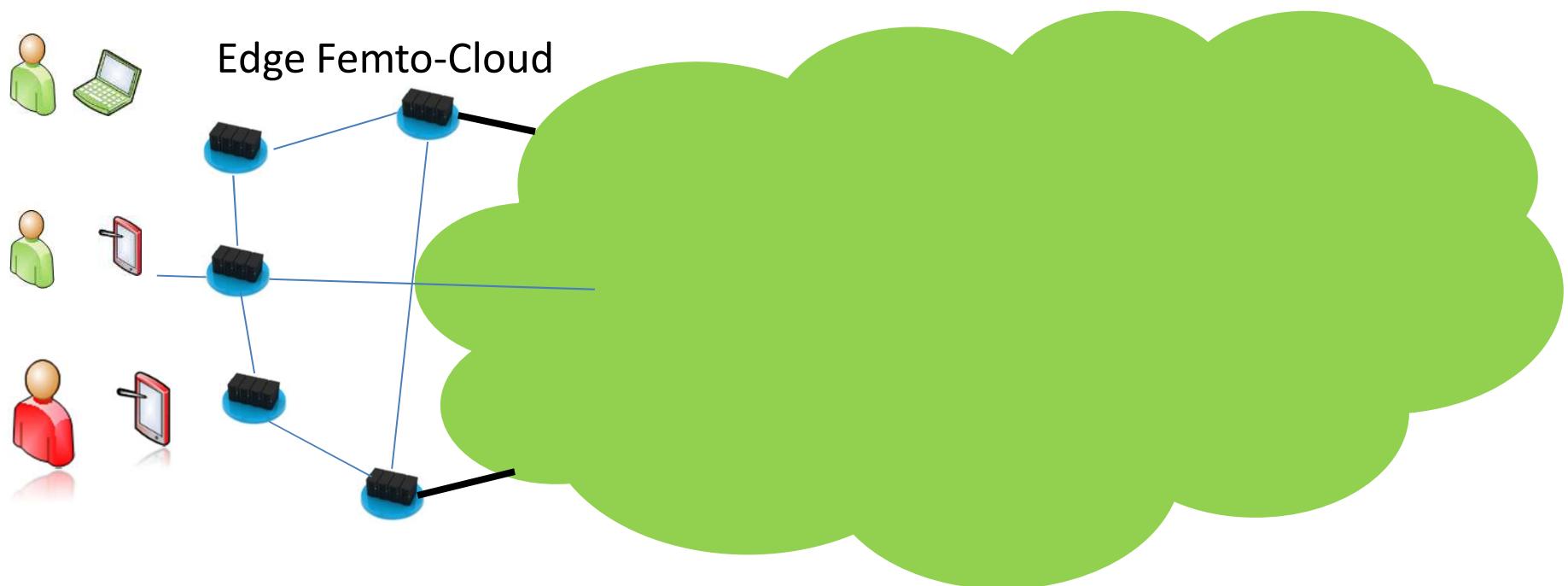


Drones network

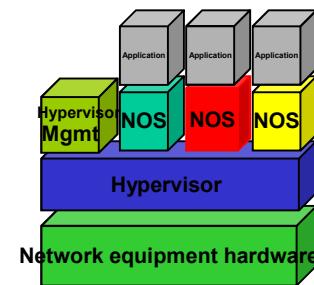
Smart edge



Femto-cloud on the edge



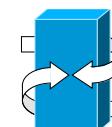
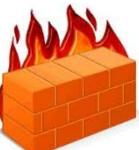
Edge Femto-datacenter



Client interface: network app



Network App



Edge femto-datacenter

