

IOT based Smart Outdoor Lighting

Feng HUANG

Philips Lighting

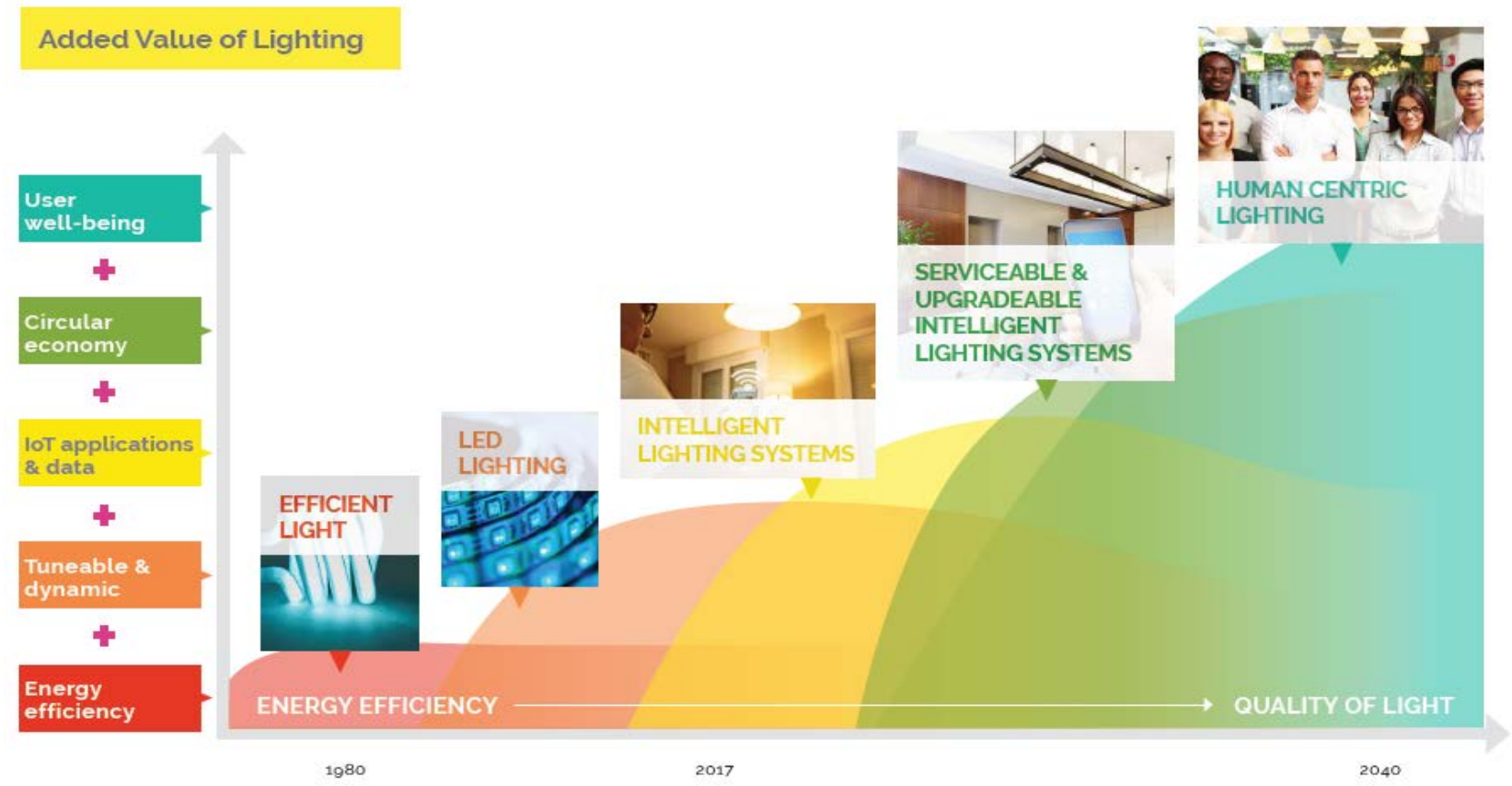
May, 2018, Shanghai

PHILIPS

Our new company name



The Transition of Lighting... More than VISION



Human Centric Lighting

Light has an effect on



Vision

*Sight,
safety and
orientation*



Body

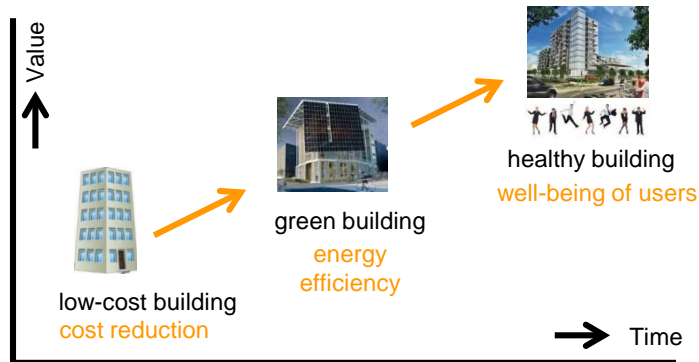
*Alertness,
cognitive
performance
and sleep/wake
cycle*



Emotion

*Mood, energize
and relaxation*

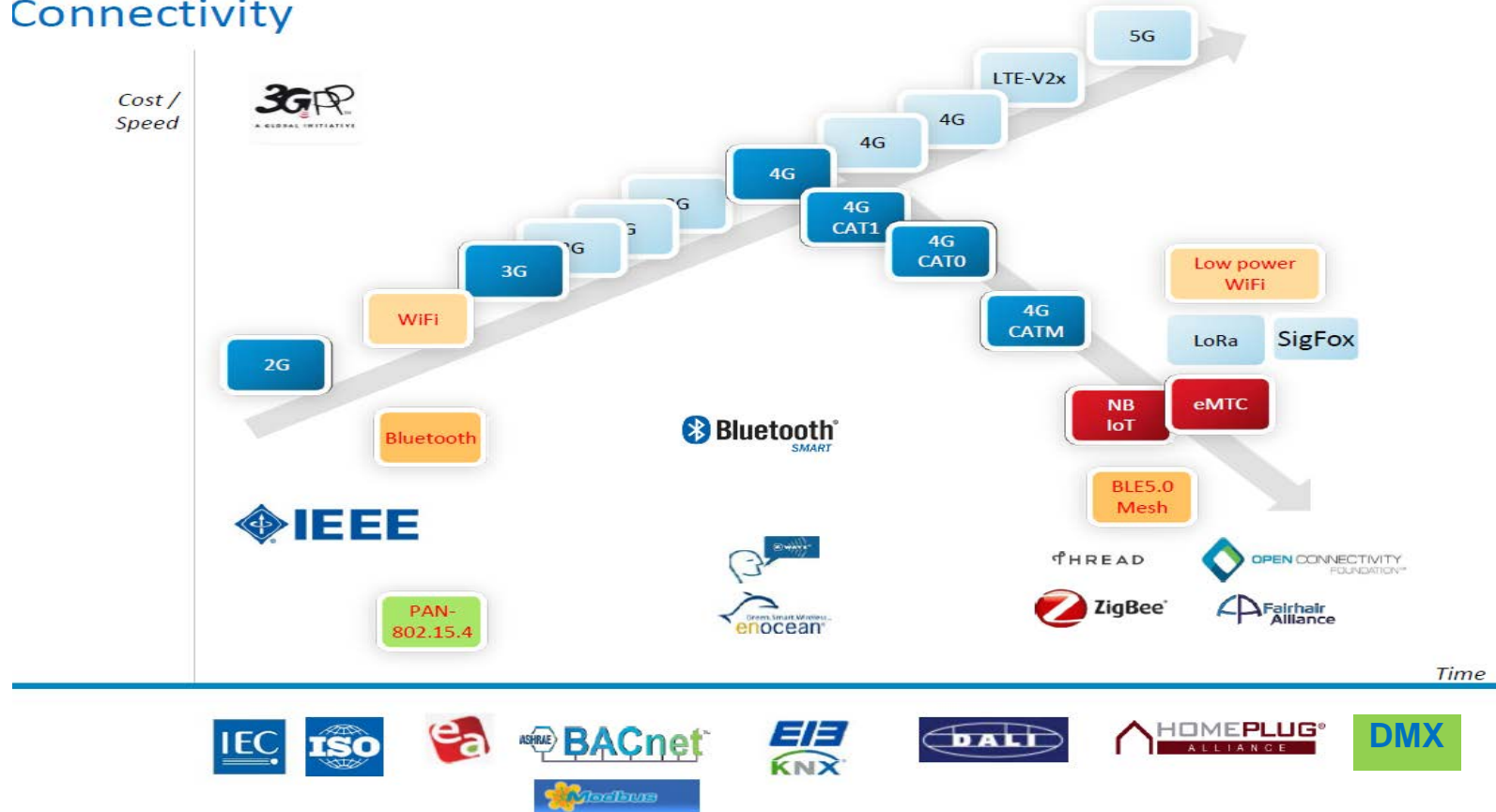
Main focus in building



眼之所见+心之所想+情之所感

System-Connectivity is Most Important, Head to IoT

Connectivity



Summary-connectivity

物联网无线技术的定位



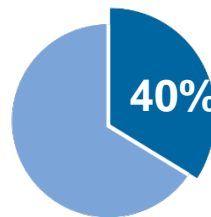
没有最好的连接，
只有合适的连接。



Public lighting is everywhere, but connectivity is not



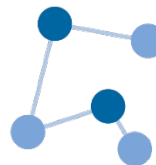
~300
million street lights
worldwide¹



Lighting can account for
up to 40% of a city's
total energy
consumption²



On average,
public lighting is
more than 20
years old³



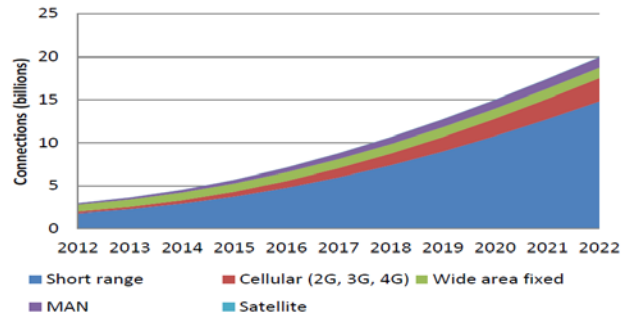
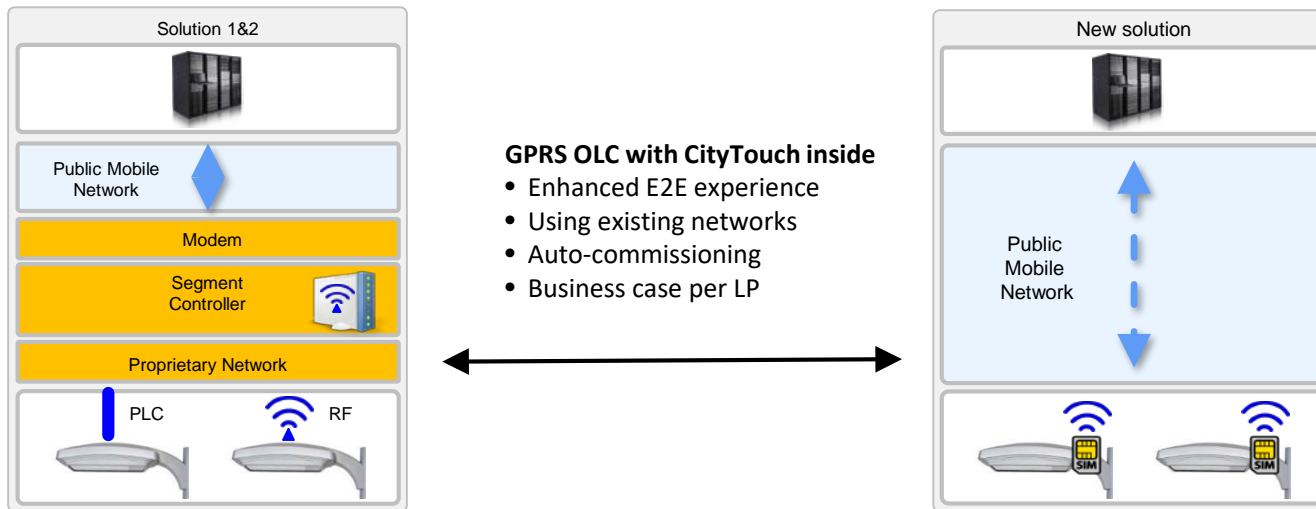
2% of installed systems
are connected,
expected to reach 35%
by 2025³

¹ Northeast Group, *Global LED and Smart Street Lighting Forecast 2015-2025*

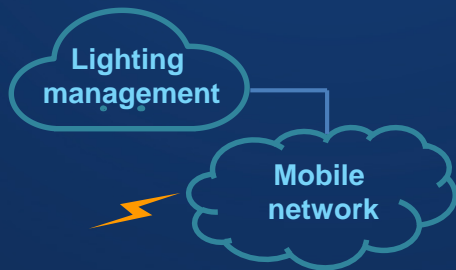
² European PPP Expertise Centre (EPEC), European Commission, *Energy Efficient Street Lighting*, 2013

³ Philips market analysis

Connected road lighting system (Layer2 Vs Layer3)



Smart Connected Lighting Solution – NB-IoT is Promising

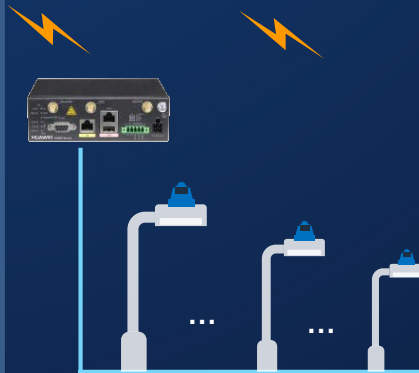


Group control

- High power consumption
- Unable to report status of each light
- Unable to control each individual lights.

Individual control

- 10% power saving by precise light control
- 50% maintenance cost saving by accurate status report



PLC

- High interference from power cable
- Unstable coverage due to varied impedance



Zigbee

- High interference due to unlicensed spectrum
- Unstable coverage due to weather impact



NB-IoT

- 20dB coverage gain vs GSM
- 100K connections/cell
- Carrier-grade Reliability

NB-IoT 芯片和模组

华为海思Boudica

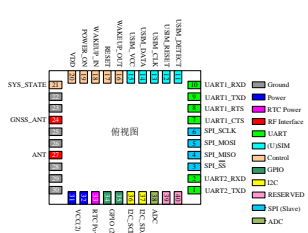
Intel XMM 7115

Qualcomm MDM9206

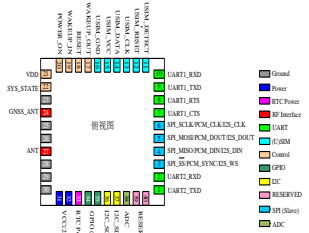
Nordic nRF91

中兴微电子 Wisefone7100

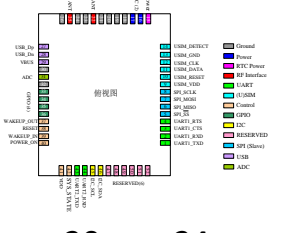
展讯、MARVELL、MTK、RDA



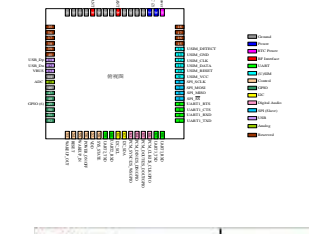
16mmX18mm



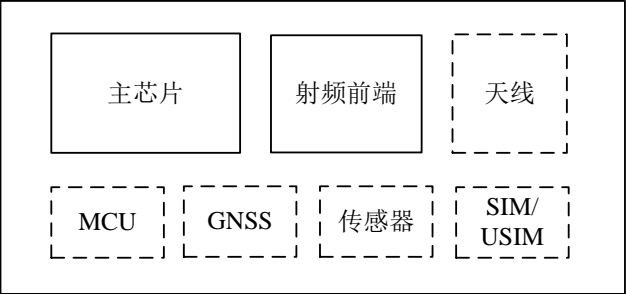
16mmX20mm



20mmx24mm



24mmx26mm



移远	BC95
中兴物联	ME3612
Ublox	SARA-N201
利尔达	NB05-01
有方	N20
移柯	L700
芯讯通	SIM7000C
龙尚	A9500

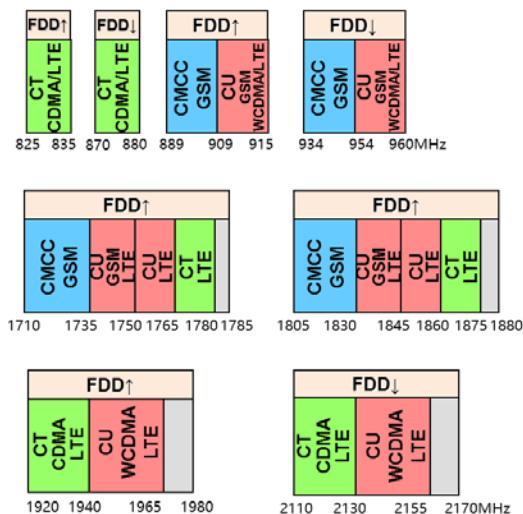


浙江鹰潭-泰华、浙江杭州-浙大网新、山东淄博-AoD中微、江苏常州-飞利浦、南京-东大智能/NARI、上海产业研究院

开发NB-IoT产品需要面对的问题

1. 接入频率
2. 模组价格
3. 运营商网络选择、资费、补贴政策、SIM卡
4. 物联网管理平台的接入

目前NB-IoT模块价格约为120元，大规模量产约为30-100元。



CT: 中国电信
CMCC: 中国移动
CU: 中国联通
灰色频块 未分配

Huawei: Oceanconnection
CMCC: OneNet
CT: 10649.cn
CU: 2017-6-27日发布物联网连接管理平台



单位: 万个、元/个

产品制式	2016 年		2015 年		2014 年	
	销售量	平均 售价	销售量	平均 售价	销售量	平均 售价
2G	688.44	18.90	734.45	24.15	478.12	36.17
3G	129.84	115.53	112.35	113.80	100.23	115.95
4G	35.85	174.40	7.23	203.90	0.01	287.66

Other LPWAN



LoRa 

Sigfox

ZETA

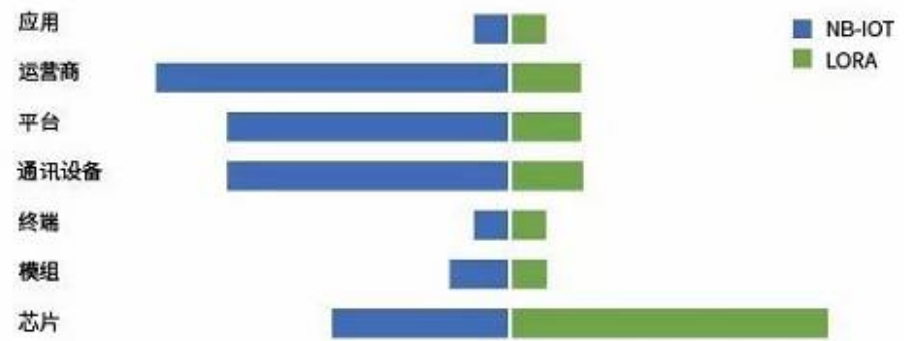
RPMA-随机相位多址接入

UNB-超窄带

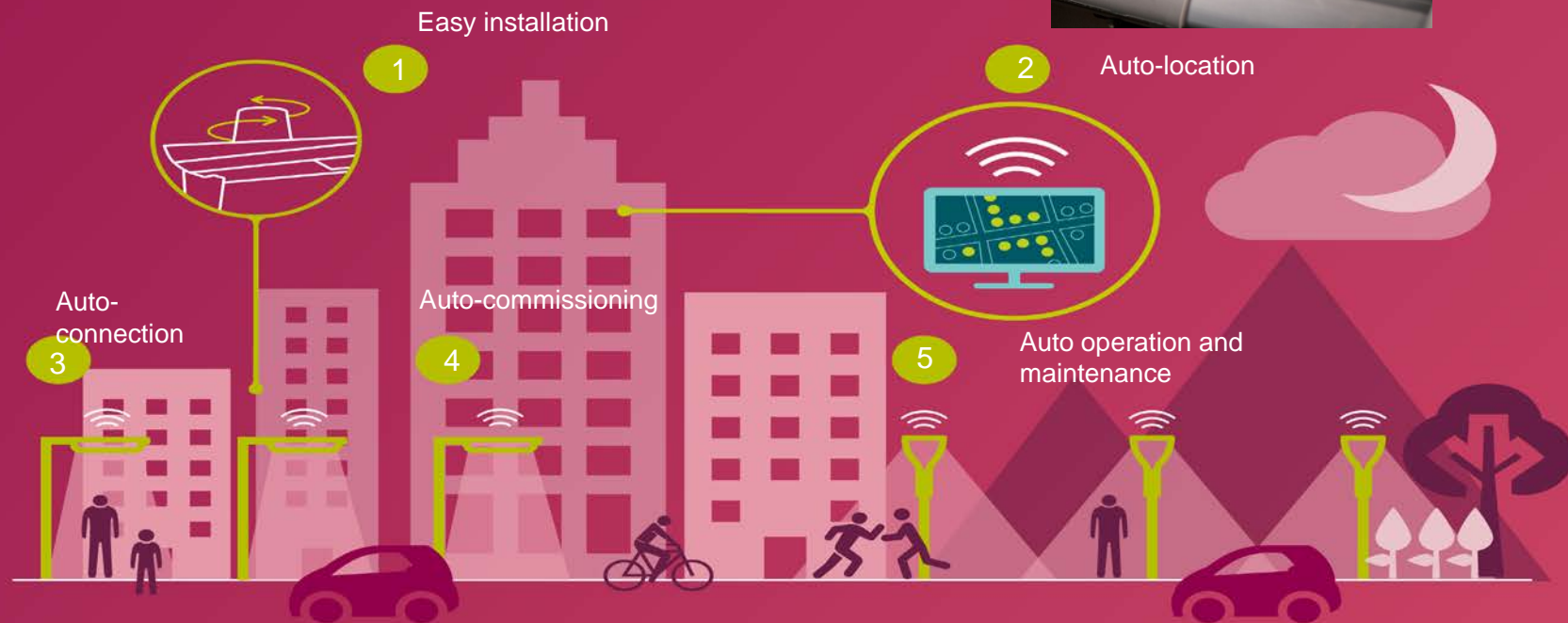
浙江联通联合阿里开通首张LoRa试验网
Orange
SKT

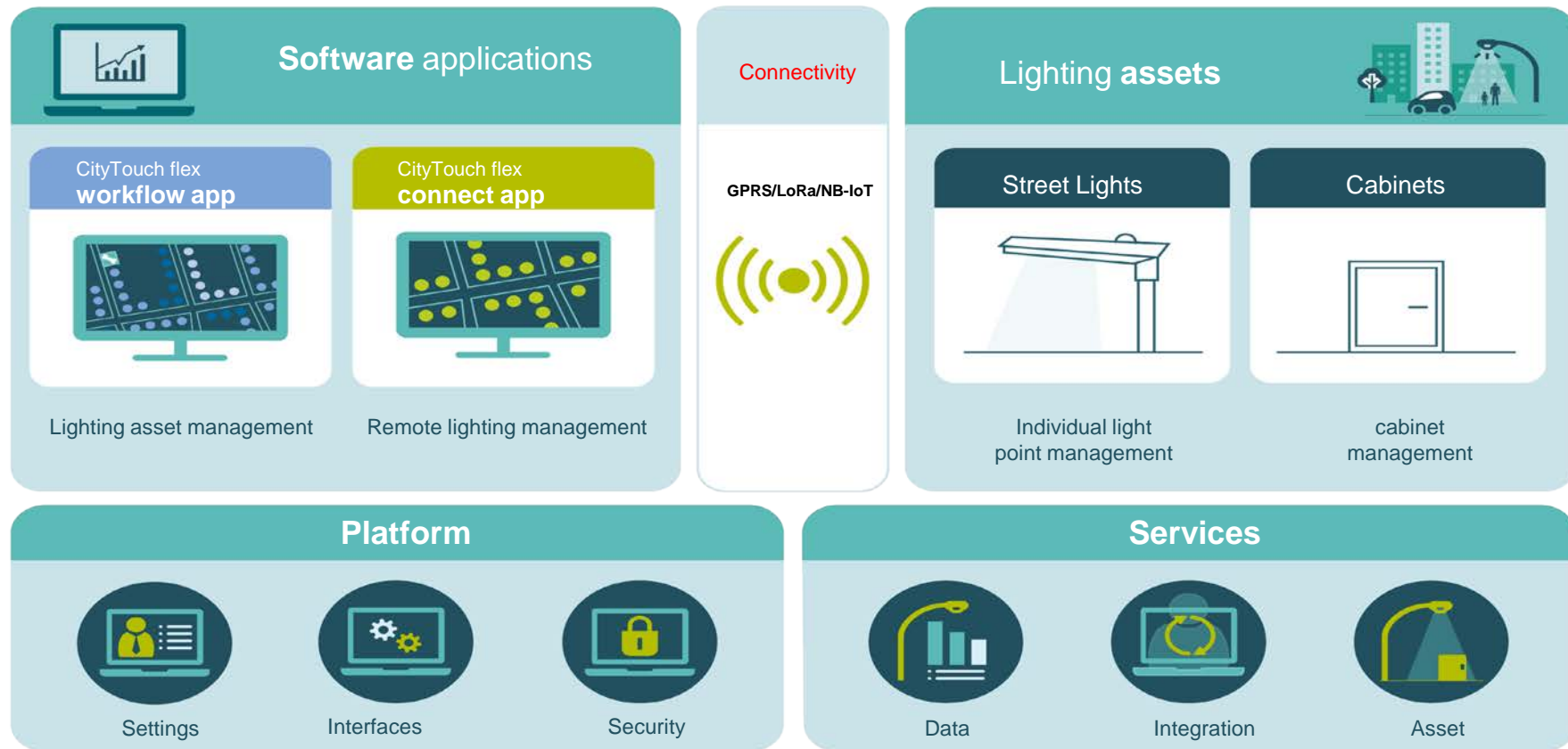
频率使用许可

公地悲剧

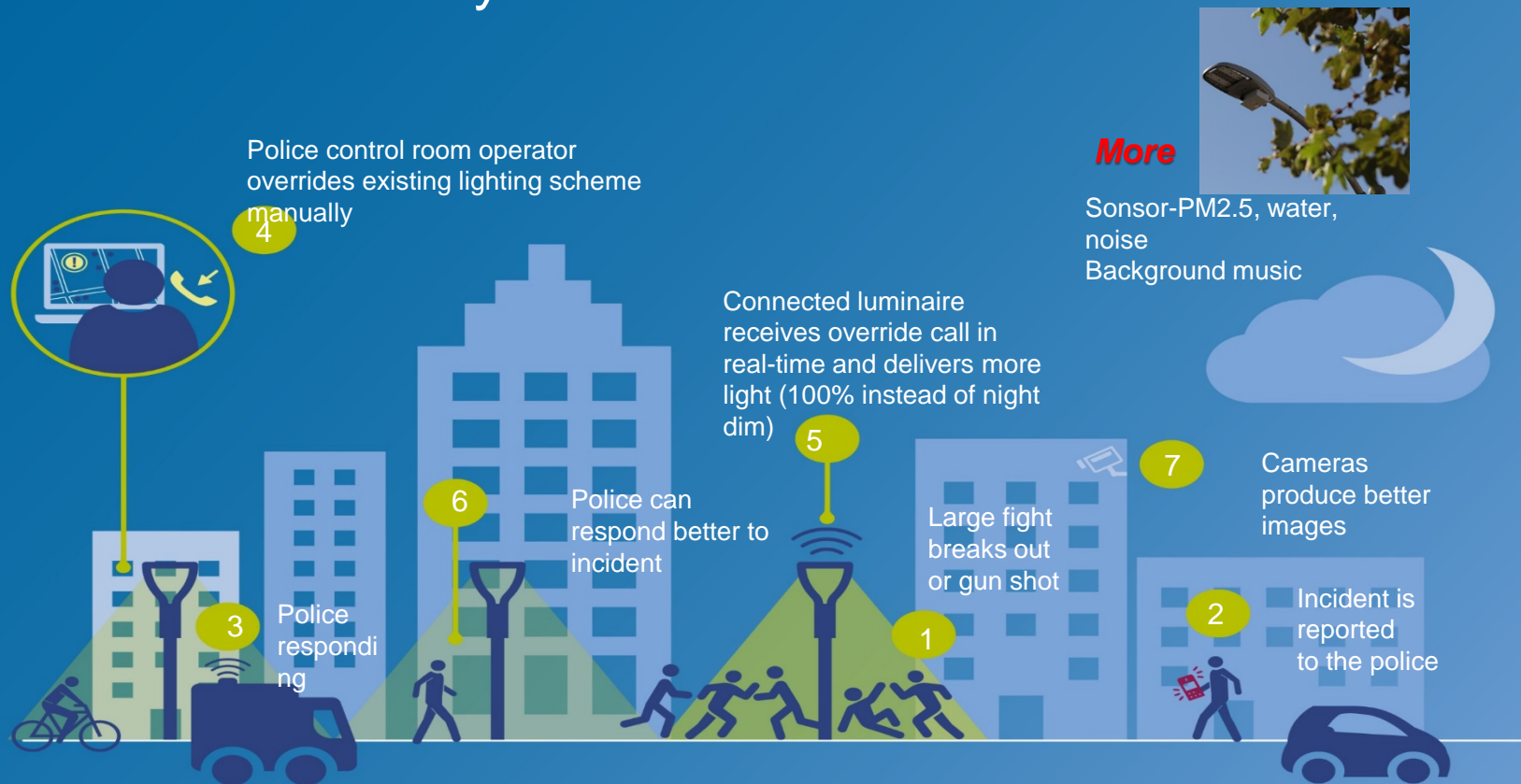


Service-Automation

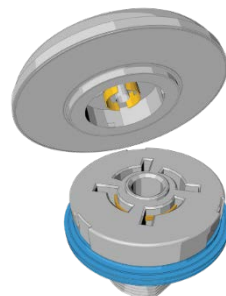
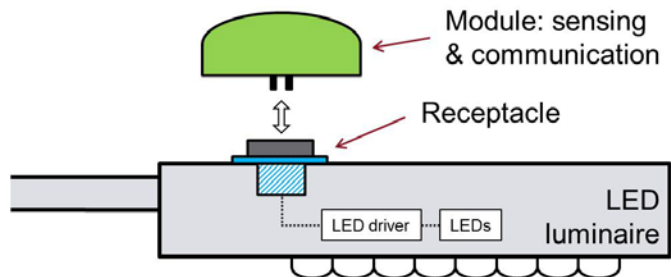




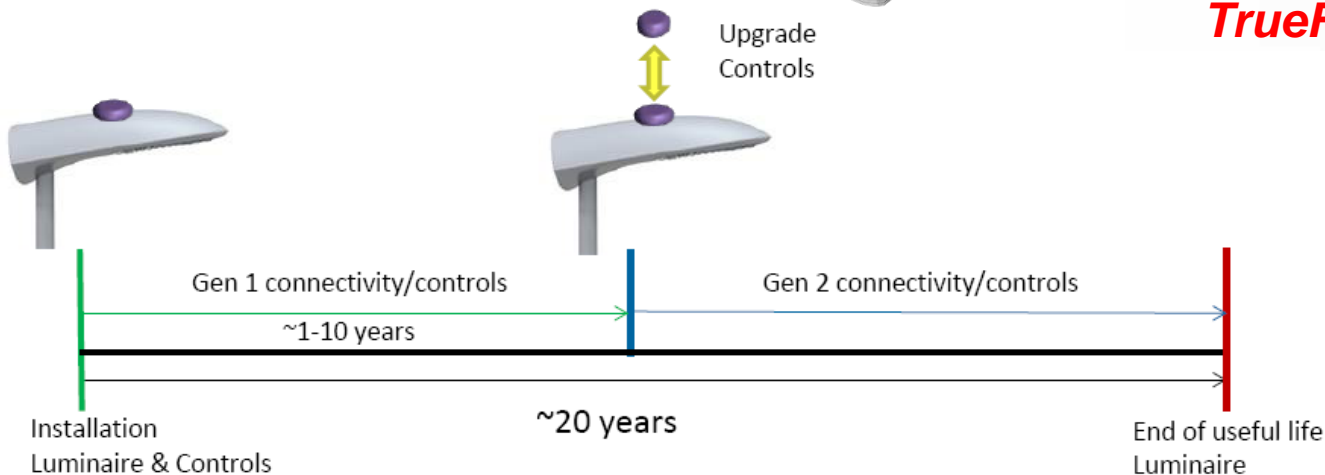
Service-Public safety



可升级的智能道路照明



TrueForce



● = Communication box

