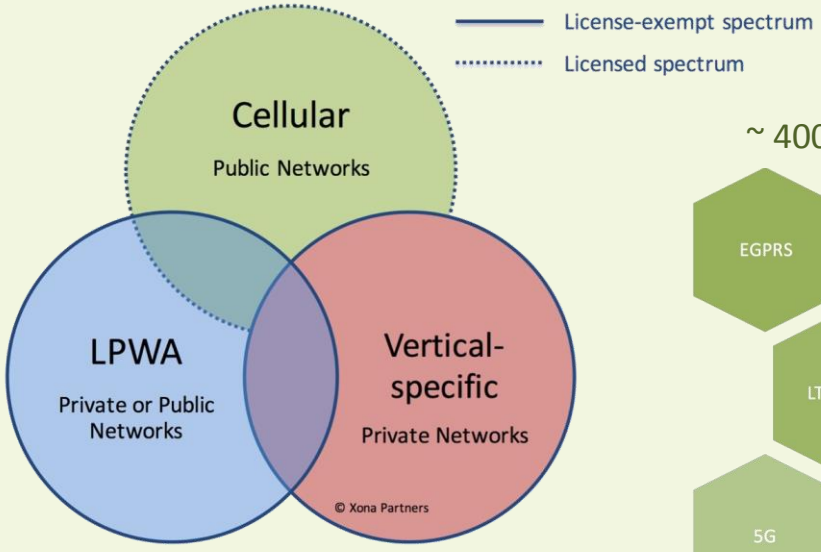
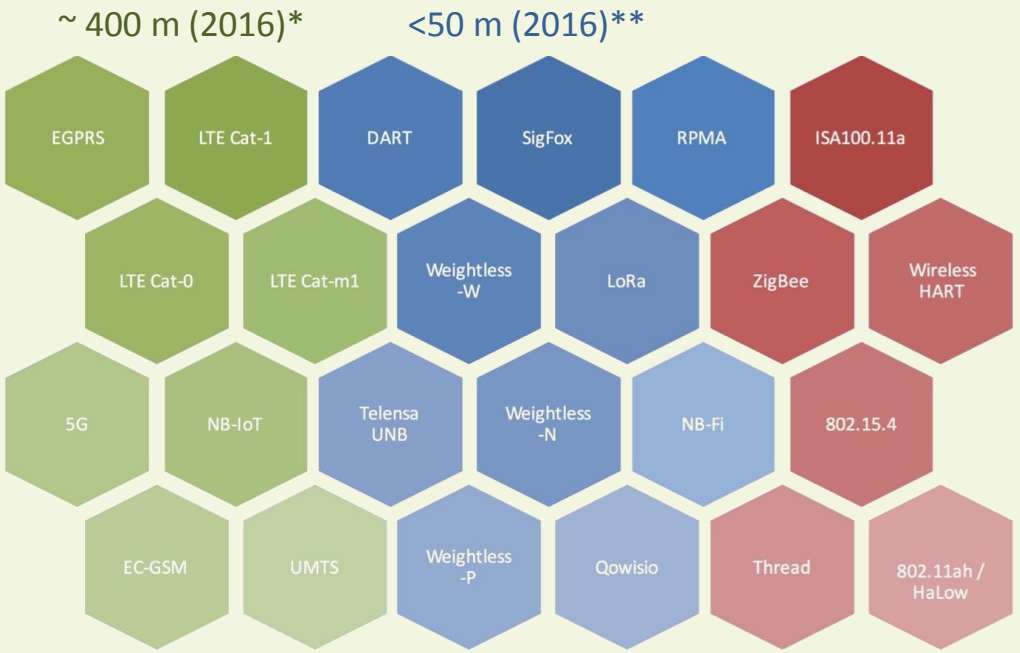
Low Power Wide Area Networks (LPWAN) Overview and Applications

Dr. Riad Hartani

Paris - December 8th, 2016

Nascent Market for Wide Area Connectivity

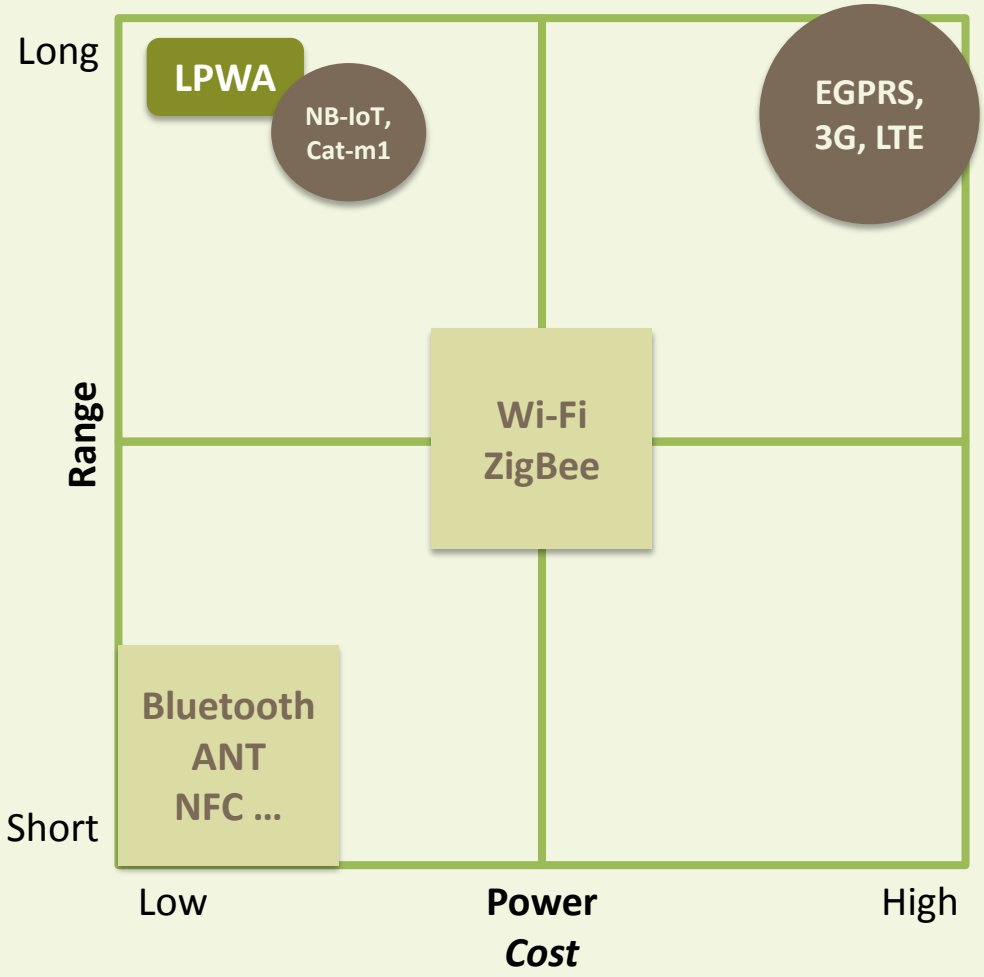




Several **technologies are vying** to capture an emerging wide-area IoT connectivity market.

* Ericsson Mobility Report, November, 2016
** Cisco VNI, February, 2016

Mapping of LPWA Technologies



> Power-optimized, on demand spot-connectivity

> Digital on/off applications with a few messages per hour

> Multicast/broadcast, traffic symmetry are key differentiator among LPWA technologies

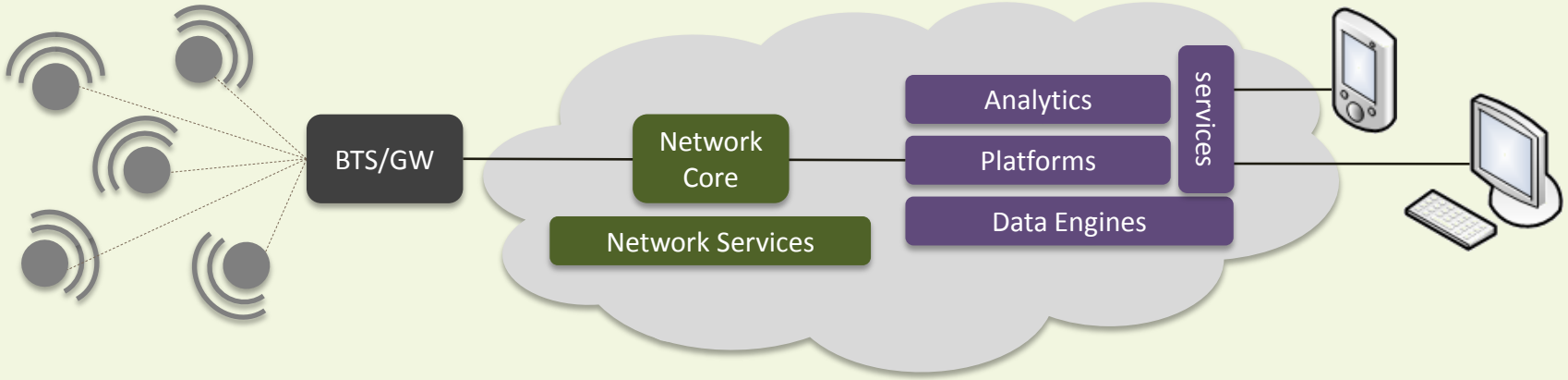
Licensed Spectrum

Unlicensed Spectrum

Whitespace/Unlicensed Spectrum

XONA PARTNERS

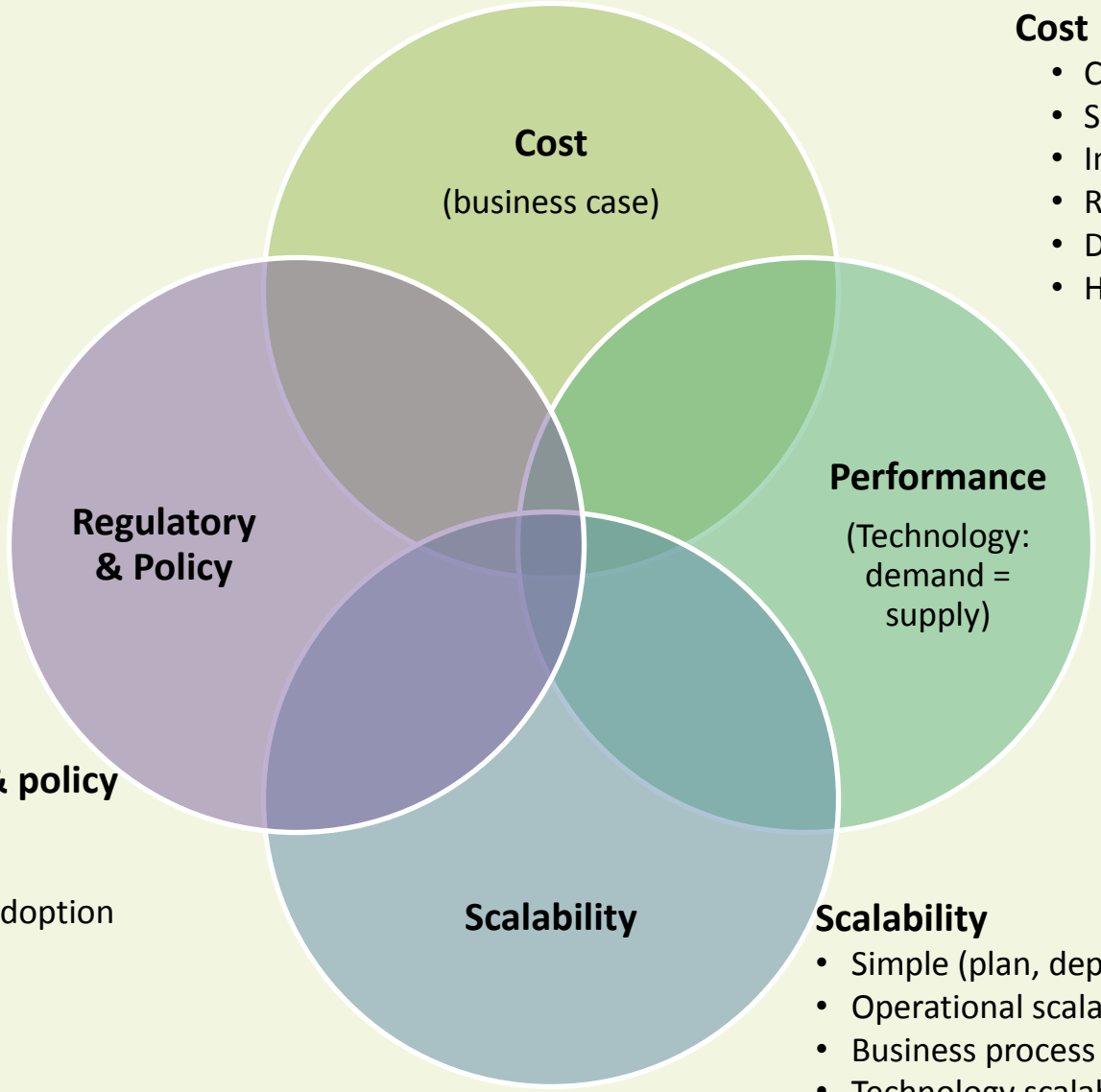
LPWA End to End Network Overview



RAN Network Sensors & base stations (gateways)	Core Network (device management, security, policy)	Cloud and Big Data Services (Application, data engines, Analytics)	Visualization UI, Front-End

LPWA have an advantage in leveraging Cloud services and Big Data techniques to provide differentiated services

IoT Applications to Technology Mapping



Cost
- Connectivity
- Support & maintenance
- Initial capex
- Recurring Opex
- Design & integration
- Hardware

Performance
- Security
- Reliability
- Latency
- Throughput

Regulatory & policy
- Spectrum
- Incentives
- Barriers to adoption

Scalability
- Simple (plan, deploy, maintain)
- Operational scalability
- Business process
- Technology scalability

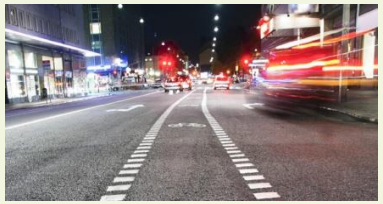
XONA PARTNERS

Wide Area IoT Use Cases

Aircraft data to airlines & suppliers

Global security tracking

Movement monitoring of elderly persons



Bike tracking

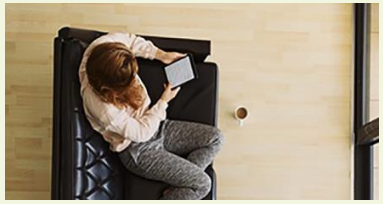
Real-time parking data

Diabetes monitoring

Connected alcohol immobilizer

Car rental process management

Industrial gas monitoring



Home security

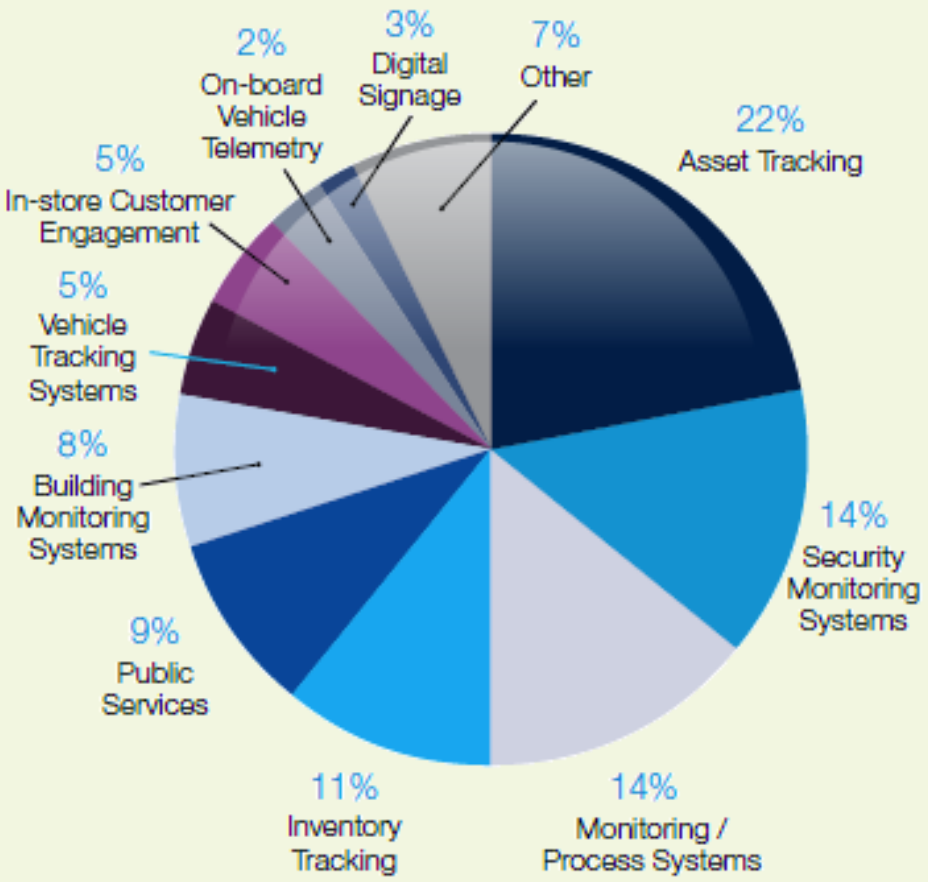
Electric vehicle charging station connectivity

Compressor waste bins

ARPU ~$10/month → with LPWA ARPU to reach lower value, e.g. $10/year → Requirements for optimized cost / efficiency

Cellular IoT Application Distribution

An Example: Large & Medium Canadian Enterprises



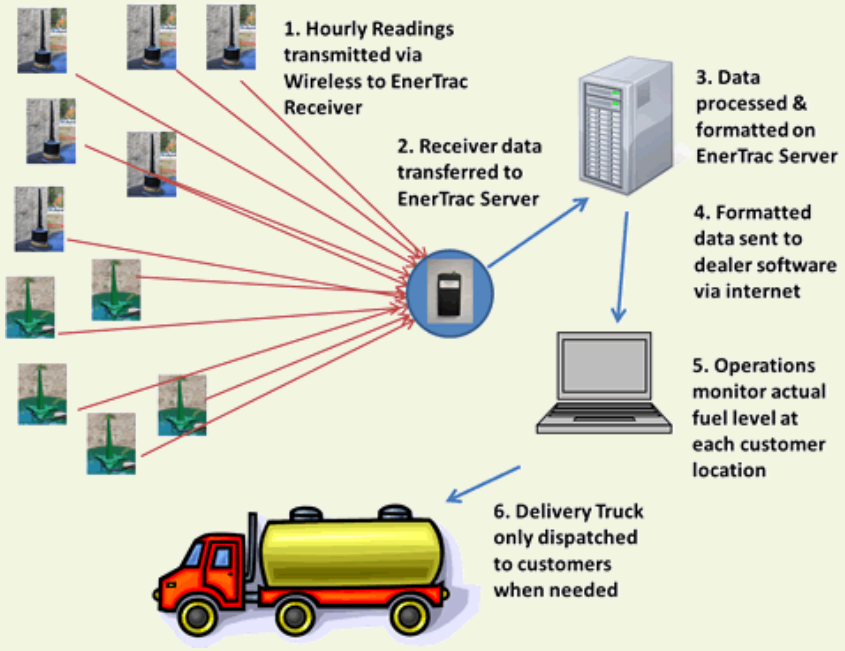
Source: TELUS/IDC Internet of Things Study 2014 (n=209)

- Average number of devices deployed per enterprise: 5,220
- 54% of projects used both wireless and wireline connectivity
- Wireless only solutions found in 28% of IoT projects
- Main platform or application deployed internally or on-premise in 72% of cases
- Cloud or hosted solutions are used in 28% of cases

Note: The survey is focused on how enterprises are using IoT and excludes many type of IoT deployments related to infrastructure businesses such as electric, water and gas utilities

LPWA Service Provider: Senet

- Network: 150+ Base stations covering ~40,000 sq. miles in the US
  - 20,000 Semtech LoRa sensors to track propane and oil tank fuel levels
  - Monitor cost: $40; monitoring fee: $2.45 / mo
- Services
  - Tank monitoring & automation (propane, heating oil)
  - Water metering (to come)
  - Water irrigation (to come)
- Data Aggregation Platform
  - Scalable Cloud-based server farm
  - Multiple Platforms for data access (Web Services/FTP)
  - Value add applications, metrics



Network as a Service

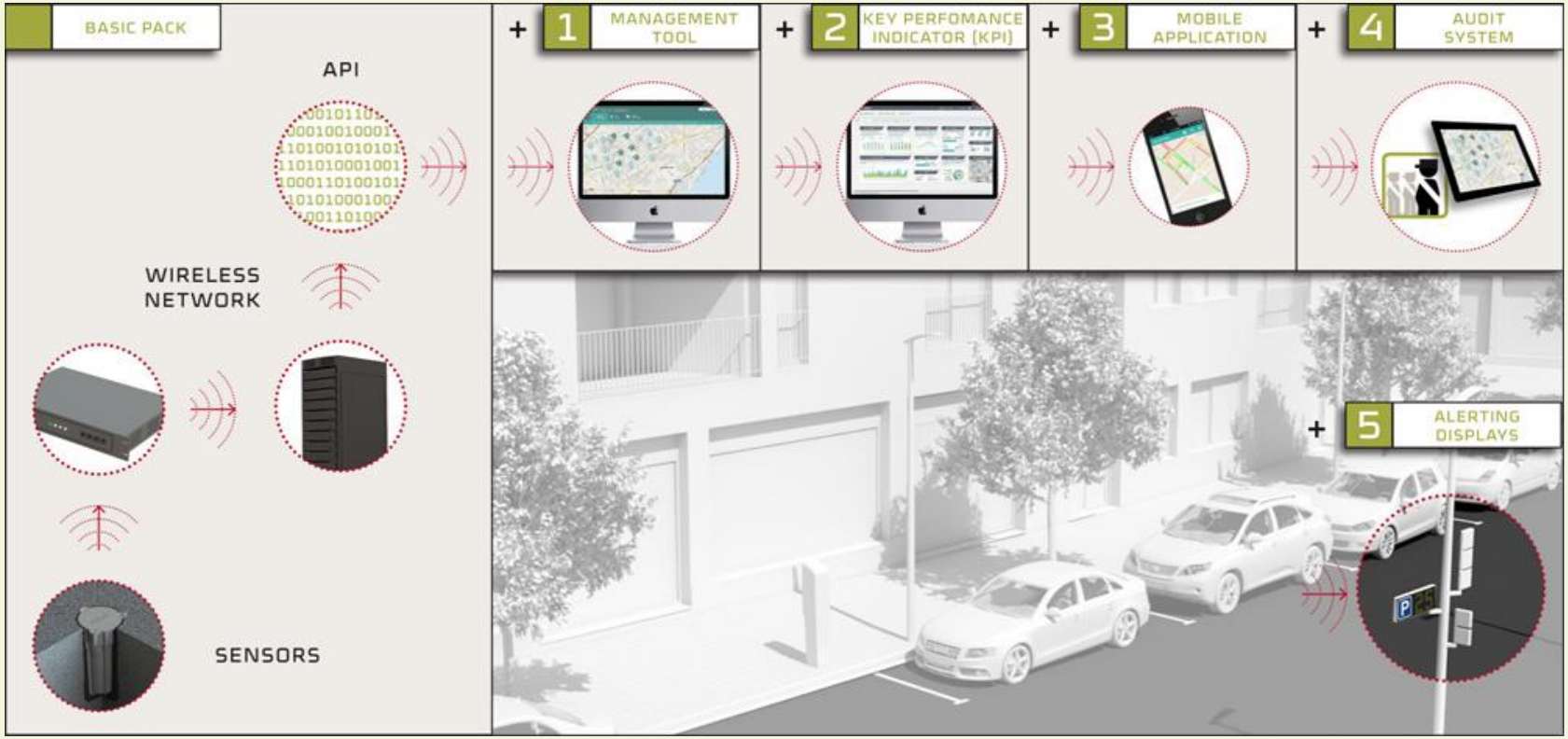
Monitor costs: $40
Monitoring fee: $2.45 / mo.

Value proposition: On average, oil delivery drivers visit each customer six times per year. They typically make the delivery runs when the tanks are filled at 50%, which is at a cost per delivery of $50-100. With IoT, they can deliver at 20% capacity, saving two deliveries per customer per year. If they have between 10,000-15,000 tanks, that's $1-$1.5 million a year in savings.

http://www.senetco.com/

LPWA Application Provider: Worldsensing

Fastprk Street Parking



- When a car parks over the sensor, it is detected automatically
- The occupancy is instantly reported to users via apps and illuminated panels in the street
- Central control gets real time analytics about parking bay occupancy

XONA PARTNERS

LPWA Applications

Smart Cities

- Alarms
- Fire detection & protection
- Building automation / control systems
- Elevator communications services
- Energy operations
- Transportation facilities
- Construction site equipment & machine monitoring
- Intelligent traffic management
  - Parking space management / payment
  - Congestion charging and road tolls
  - Traffic volume monitoring
  - Connected road signs, traffic lights and enforcement cameras and in-vehicle congestion and toll devices
- Environment and Public Safety
  - Street lighting
  - Waste collection

LPWA compatible with Smart City applications

Cellular most suitable for automotive segment

Automotive

- Insurance
- Security & tracking
- Lease, rental, share car management

Short range and cellular are primary in healthcare

Healthcare

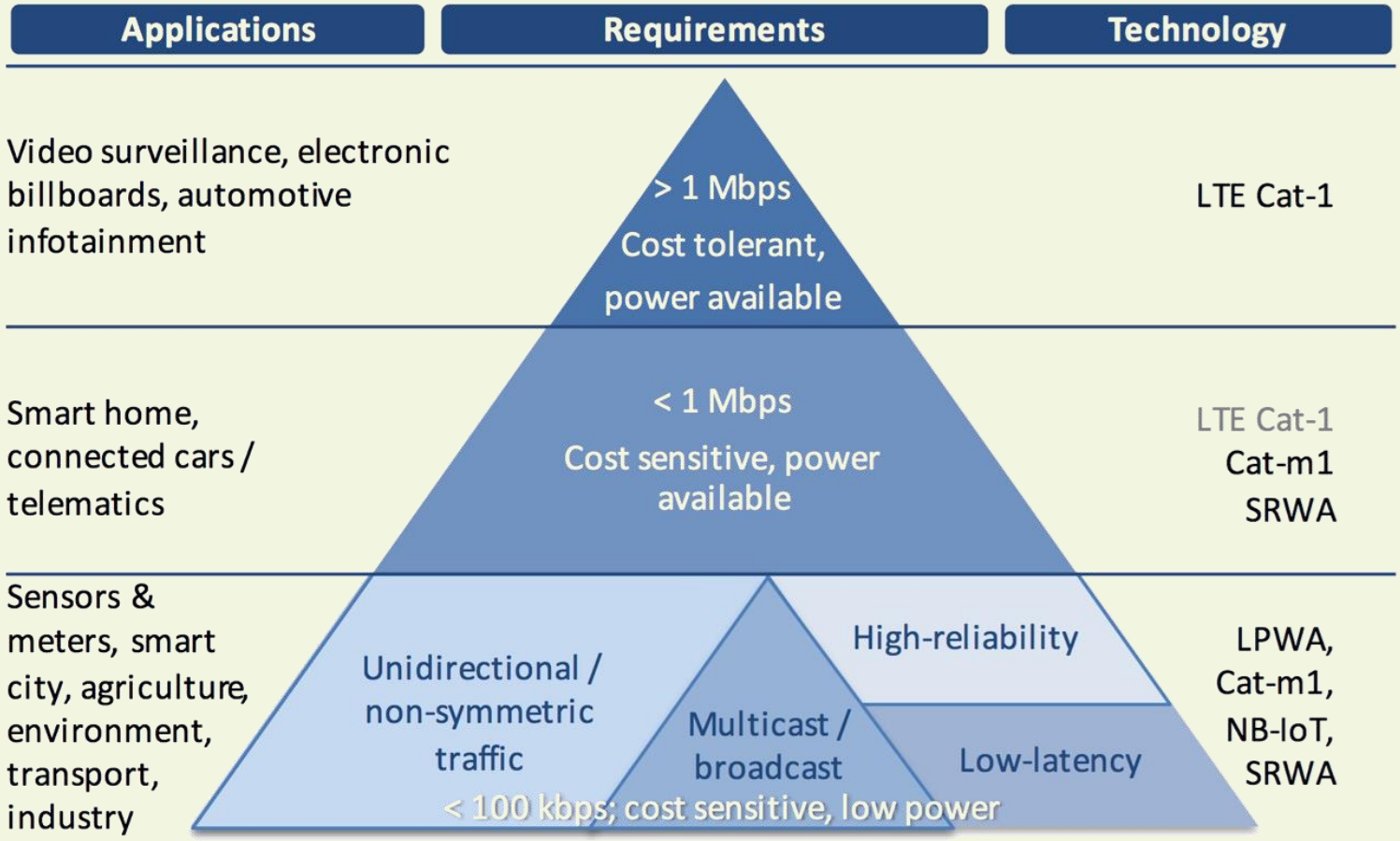
- First responder connectivity
- Connected medical environments
- Clinical remote monitoring
- Clinical trials
- Assisted living
- Worried well personal monitoring

Environment & Agriculture

- Environmental monitoring
- Land agriculture
- Fishing
- New energy sources

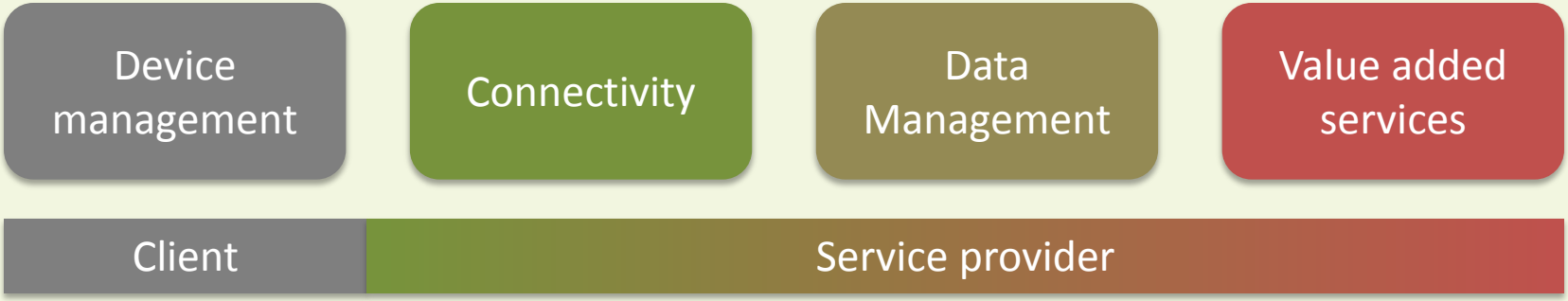
LPWA most compatible

How the Market Is Shaping Up



SRWA: Short range / wide area; peer-to-peer protocols

Opportunities for IoT Service Providers



- Business Considerations
  - Most LPWA connections will generate only minimal connectivity revenue (~$2-$3 / device / year)
  - Service providers will want to increase their revenue by providing end-to-end and support solutions in order to maintain their relevance in the value chain
  - Strategic importance of data management and analytics services

About Xona Partners

A Boutique Advisory Firm Specialized in Developing New Technology Ventures & Growth Strategies

Private Equity & Venture Funds

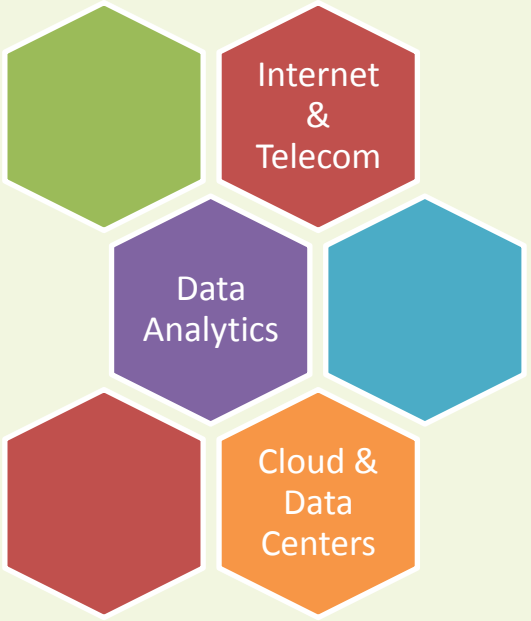
- M&A due diligence; competitive analysis & positioning

Technology Corporations

- Develop new business ventures

Governments, Regulatory & Policy Makers

- Market & technology assessment to form policy decisions



Google intel HUAWEI Aviat NETWORKS HKEx 香港交易所 香港寬頻 HONG KONG BROADBAND NETWORK BCN SMART CITY NTT

SK telecom Celestica NOKIA SOLiD TECHNOLOGIES CREATIONLINE, INC. MINTZ LEVIN Sumitomo Corporation

XONA PARTNERS

XONA Partners

Innovate. Enable.

Contact: advisors@xonapartners.com

Web: www.xonapartners.com

Partners & Advisors: www.xonapartners.com/Team