Smart cities. Now.

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@Telensa
Telensa is the only firm monetizing multiple IoT applications including smart lighting and smart parking. We deliver ultra-scalable, private network solutions through Ultra Narrow Band technology and an integrated suite of M2M applications called aptos.

Telensa delivers ultra-scalable, private network solutions that address the needs of today’s high value infrastructure opportunities – smart lighting, smart metering and smart cities. We have deployed more than 8 million devices worldwide including the US, Russia, Brazil, China and the UK.

We integrate technology to optimise the business case for each application, creating cost and performance optimised sensor devices and minimising network overheads.

Telensa’s business model is about building a global network of local licensees for our solutions. To ensure rapid and consistent deployment, we have developed an integrated suite of M2M packages. We call this suite aptos. Each package combines some or all of the following components:

- connected devices such as sensors, radio modem modules and base stations
- an operations system including authentication and security as well as routing to application providers
- applications such as smart lighting, water metering, smart parking, environmental monitoring
- pre-integrated third-party applications
- delivery, including training and integration services for new applications, support on cost control and business case development
About aptos

Telensa’s aptos is an integrated suite of M2M packages that addresses IoT opportunities affordably, effectively and profitably.

aptos for smart streets and smart homes
Remote control and monitoring of lighting, power, waste, water and more for city and regional authorities; home area networks. Enables better use of valuable resources and saves money for end users, corporations and public authorities. All networks are tailored to specific needs but can be adapted and applied across an ever-growing number of smart city applications.

aptos for detection and monitoring
Vehicle detection, parking control, managing traffic flow; charging systems for individuals and vehicles. Reduces congestion, adds efficiency, saves money. The package combines a radio network, car detection devices using magnetic sensors, a central system to handle the large data flows and integration with user applications.

aptos for tracking and recovery
Tracking of assets from warehouse to store; tracking and recovery of stolen vehicles or high value goods. Deters theft, enhances transport efficiency, protects investments. The potential basis for integrated improvements in global transport systems, leading to cost reduction, speedier delivery and greater client satisfaction.
Telensa’s market-leading smart street lighting employs the most widely adopted central management system in the world

Street lights are difficult and expensive to manage. Telensa’s smart lighting solution enables control of thousands of street lights from one Central Management System (CMS). Control is achieved through our Ultra Narrow Band technology, which is both efficient and proven at scale.

Telensa’s smart lighting solution provides detailed information from all street lights, which aids operations and greatly reduce maintenance costs, by removing the need for service visits and patrolling. This delivers the ability to:

- identify lamp failures immediately
- reduce night maintenance inspections
- eliminate day burners
- improve public service
- reduce repair times by providing fault diagnostics
- reduce energy costs by up to 60 per cent using dimming
- intelligent trimming to optimise switch on times

Telensa has hundreds of clients globally, controlling nearly 1 million street lights through CMS, the largest of which is controlling 130,000 lights from one system.
Drivers looking for a parking space can cause up to 30 per cent of inner city congestion. Telensa’s smart system delivers real time information to drivers about where to find a parking space. It can drastically reduce congestion within days of deployment.

**Low cost sensors**
Telensa’s solution uses low cost, rugged sensors embedded in each parking space to detect when cars arrive or depart. The sensors continually monitor the magnetic field around a parking space to detect when a car is present.

Occupancy data is sent via a long range wireless link to dedicated base stations which in turn send the information back to a central collection system. The location of empty spaces can be communicated to drivers via electronic display signs at the side of the road, via a web interface or through a mobile application that allows drivers to automatically find their nearest empty parking space. Recent upgrades mean drivers will also be able to register electronic permits, allowing traffic wardens to respond more quickly and effectively to illegal street parking. This has the potential to halve enforcement costs.

**Ease of deployment**
The system has been designed for use in difficult outdoor environments and does not require ongoing maintenance associated with infra-red based sensors used in indoor carparks. Our mature, efficient UNB technology means the number of radio sites required is typically 40 times fewer than comparable mesh-based systems. Sensor units have a 5-year battery life and can be installed and activated in 10 minutes, minimising disruption. The radio system operates on licence-exempt frequencies so there are no recurring subscription fees to pay to network operators.
Ultra narrow band – radio technology optimised for IoT

What is UNB?
Fundamental to the success of Telensa’s aptos IoT suite is its Ultra Narrow Band system, developed over the last 17 years – the longest-range, low power wide area radio technology with an established track record in delivering robust and efficient IoT solutions.

Ultra Narrow Band is low risk and best in class – more than 8 million UNB devices have already been deployed across 30 countries.

Financial benefits
UNB combines very long range with ultra low energy requirements. This means wide area deployments can be achieved with a minimum number of base stations. As well as lowering direct equipment costs, UNB reduces the need to find large numbers of cell sites and lowers backhaul communications requirements. UNB utilises a similar network configuration to cellular systems, with each base station able to communicate with many thousands of sensor nodes. This overcomes all of the logistical problems of mesh network technologies, such as Zigbee, again further reducing costs.

Applications
UNB typically achieves a range of 20km in rural areas and 3km in urban areas. This opens up a large number of applications that cannot be serviced with short range wireless links. UNB has already been deployed for gas smart metering, electricity smart metering, street light control systems, vehicle tracking and parking monitoring.

Future applications include water metering, traffic management, emergency response monitoring, livestock tracking and agricultural monitoring, asset tracking, container tracking, water course and flood management.
A UNB network is deployed in a similar manner to a standard cellular network. For example, 33 base stations currently cover Birmingham, a 1 million population city in the UK. Rather than requiring expensive cell sites, large masts and dedicated backhaul, a UNB base station can be installed on a street light in under 10 minutes. Sensors will automatically configure themselves to communicate with the most appropriate base station.

UNB is optimised for low bandwidth transmissions. As the bit rate is very low, the radio receiver is significantly more sensitive than cellular systems. This allows devices to transmit over a similar range as standard cell phones but at much lower power. Sensing devices can run from a single battery for several years.

The system can operate in licence-exempt spectrum but can also be adapted for use across a range of dedicated bands giving a wide range of operating models across the globe. The system operates in one of two modes:

1. **Bi-directional** in which data transfers are acknowledged
2. **Uplink only** providing the longest battery life of any competing radio system

### Technical specification

<table>
<thead>
<tr>
<th><strong>Operating frequencies</strong></th>
<th>60MHz, 200MHz, 433Mhz, 470MHz, 868Mhz, 915MHz</th>
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<tbody>
<tr>
<td><strong>Battery life</strong></td>
<td>Typically 5 to 10 years</td>
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<tr>
<td><strong>Range</strong></td>
<td>20km rural, 3km typical urban deployment</td>
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<tr>
<td><strong>Radio link</strong></td>
<td>FEC, FH, scheduled or unscheduled modes</td>
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<tr>
<td><strong>Network features</strong></td>
<td>Cell broadcast, software update over the air</td>
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<tr>
<td><strong>Device features</strong></td>
<td>Universal radio module, NFC for device configuration, software developers’ kit</td>
</tr>
<tr>
<td><strong>Approvals</strong></td>
<td>CE, FCC approved</td>
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