

**Apagado 2G y 3G
Migración y evolución
Thales**

Carlos González (FAE)

**Helping
Innovation**

- ❑ **Introducción**
 - ❑ Sobre Thales
- ❑ **Internet de las cosas, tecnologías y soluciones celulares**
 - ❑ Internet de las cosas, aplicaciones, tecnologías y soluciones.
- ❑ **Migración 2G/3G en Thales (Módulos y terminales)**
- ❑ **Solución de Thales al futuro del IoT**
 - ❑ Futuro en la Nube. Conexión con AWS
- ❑ **Preguntas**



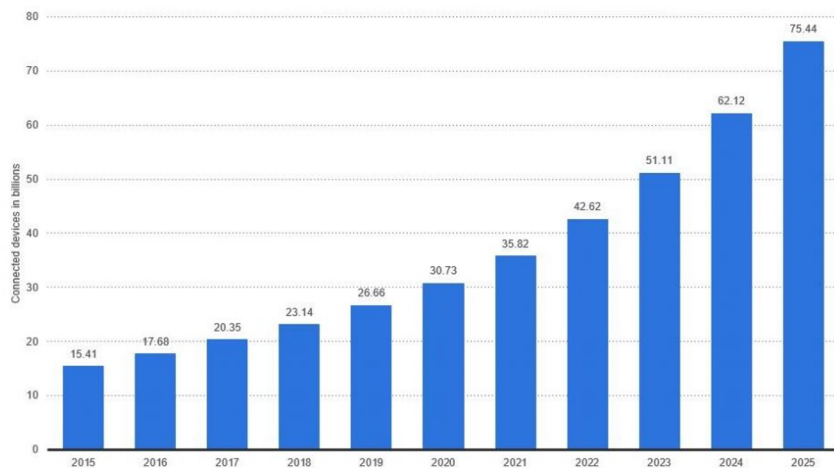
Introducción THALES

- ❑ Compañía multinacional francesa de electrónica líder en soluciones tecnológicas aplicadas a Defensa, Aeronáutica, Seguridad, Transporte y Espacio, además es centro de competencia para todo el mundo en Espacio, Seguridad de Infraestructuras Críticas y Transporte. Cuenta con más de 64.000 empleados en todo el mundo.
- ❑ En 2019 completó la adquisición de Gemalto, creando un líder global en identidad digital y seguridad. Con Gemalto, Thales cubre toda la cadena de decisiones críticas en un mundo ya digital, desde la generación de datos por parte de sensores hasta la asistencia para la toma de decisiones en tiempo real.
- ❑ Involucrados en electrónica industrial, electrónica médica, monitorización de seguridad e Internet de las cosas (IOT).

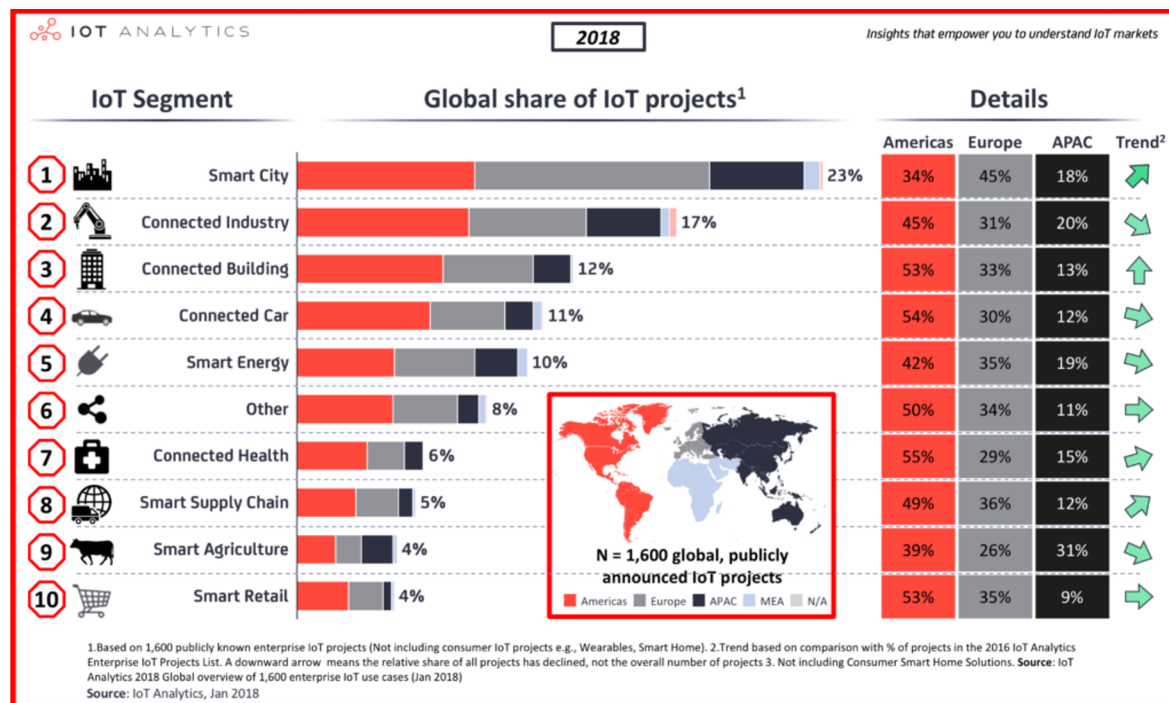


Internet of Things - number of connected devices worldwide 2015-2025

Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 (in billions)

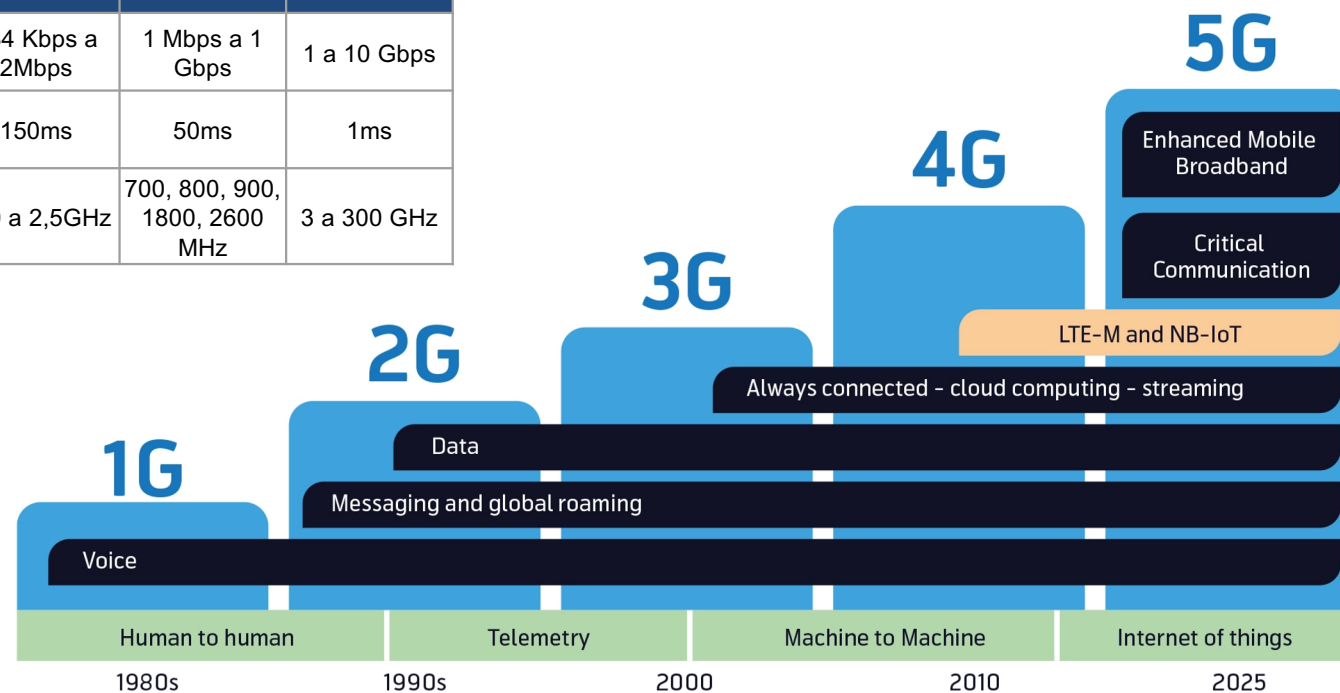


statista



- ❑ **Energía**
 - Smart Meters
- ❑ **Automoción**
 - Vehículos conectados
- ❑ **Internet de las Cosas Médicas (IOMT)**
 - Dispositivos médicos (Wearables, medidores de presión sanguínea, monitores de ritmo cardíaco, etc)
- ❑ **Seguridad y sistemas de automatización**
 - Sensores de movimiento, transmisión de vídeo, sensores en el hogar, etc
- ❑ **Seguimiento de activos (Asset Tracking)**
 - Flotas de vehículos, contenedores, etc
- ❑ **Terminales de Pago (POS)**

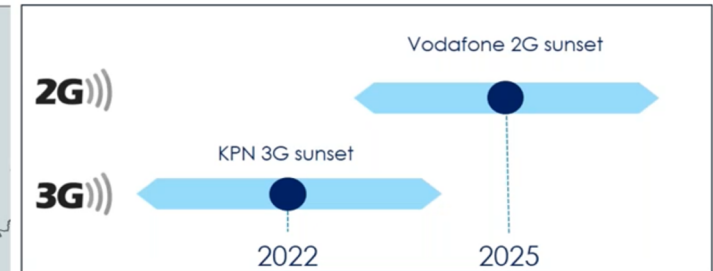
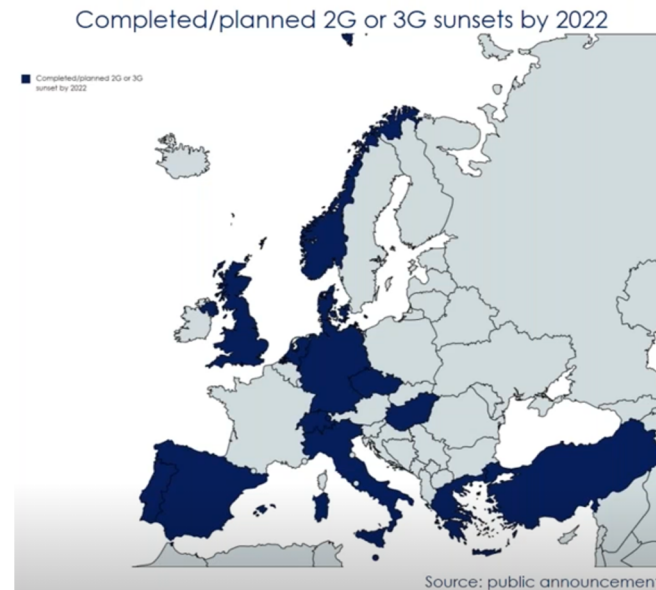
Generación	1G	2G	3G	4G	5G
Velocidad	1 a 2,4 Kbps	14 a 64 Kbps	384 Kbps a 2Mbps	1 Mbps a 1 Gbps	1 a 10 Gbps
Latencia	-	-	150ms	50ms	1ms
Frecuencia	800-900 MHz	850-1900 MHz	800 a 2,5GHz	700, 800, 900, 1800, 2600 MHz	3 a 300 GHz



Redes 2G y 3G

Estado actual

- Amplio recorrido en la última década
- Más de 35 mil millones de dispositivos IoT en 2021
- Rápido crecimiento con 4G y 5G
- Necesidad de liberar el espectro para nuevas tecnologías



- eCall service still running on 2G/3G
- Smart meters deployed on 2G in 2018/2019 i.e. in Italy
- VoLTE not widely adapted by operators and many roaming agreements are still missing

Redes 2G y 3G

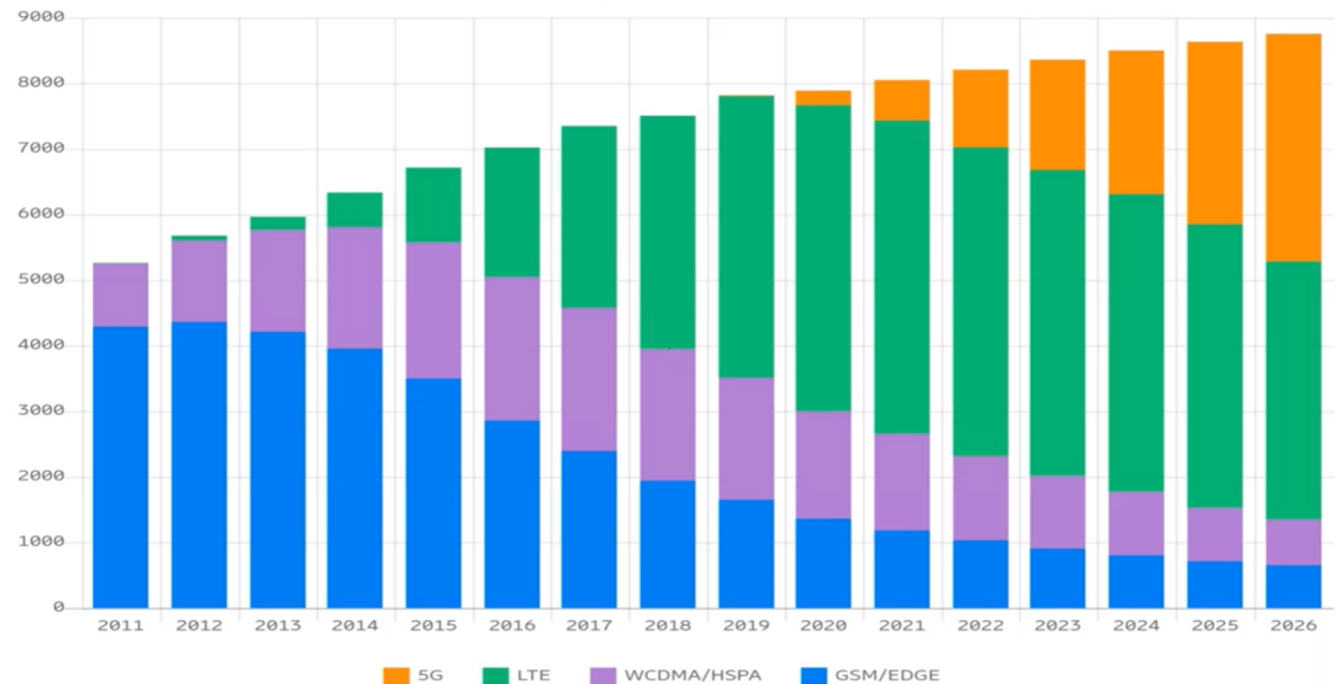
Estado actual

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Mobile subscriptions

Unit: Million

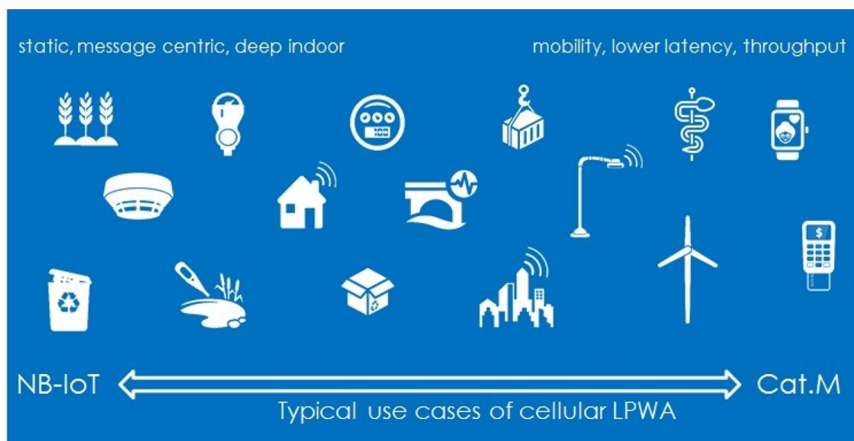
Source: Ericsson (November 2020)



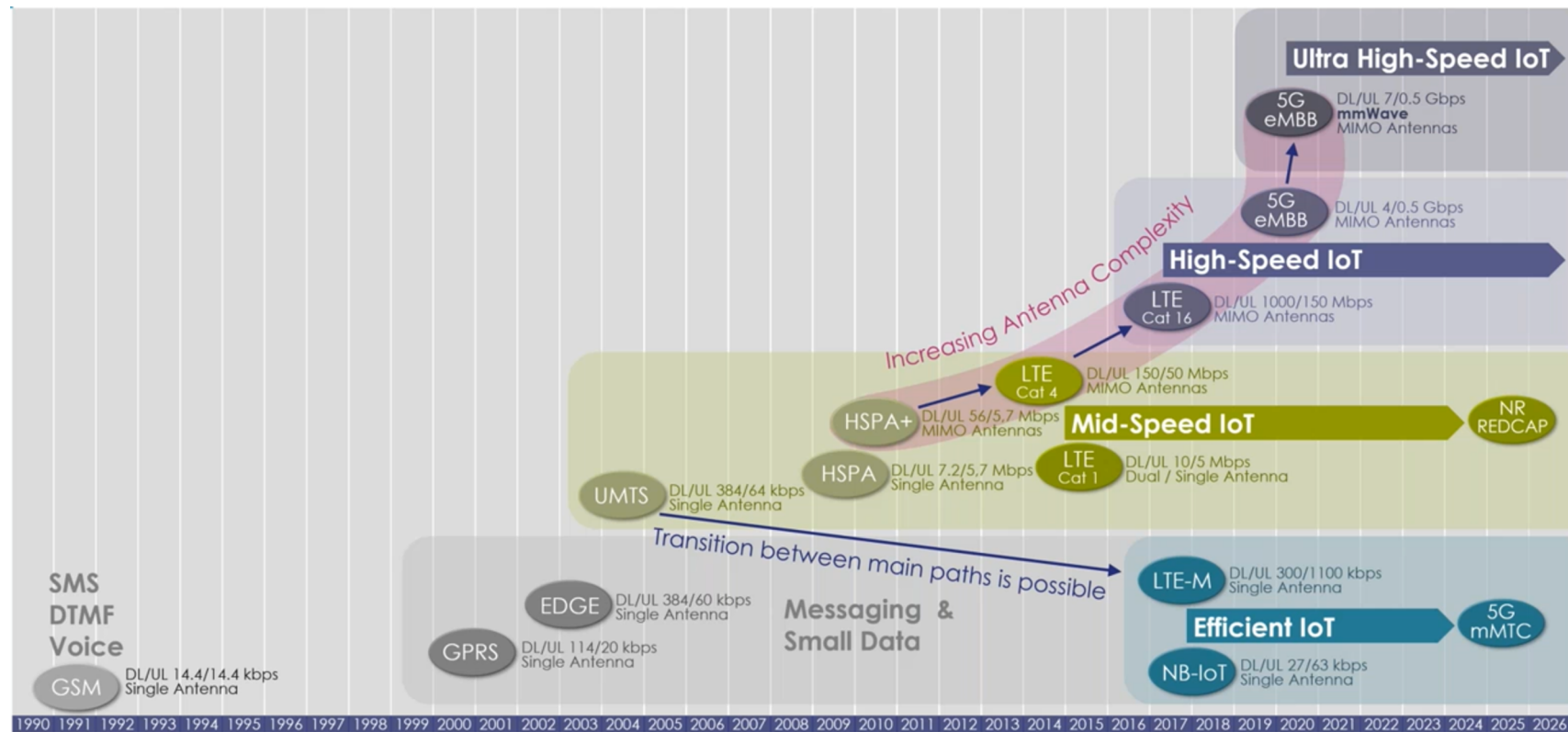


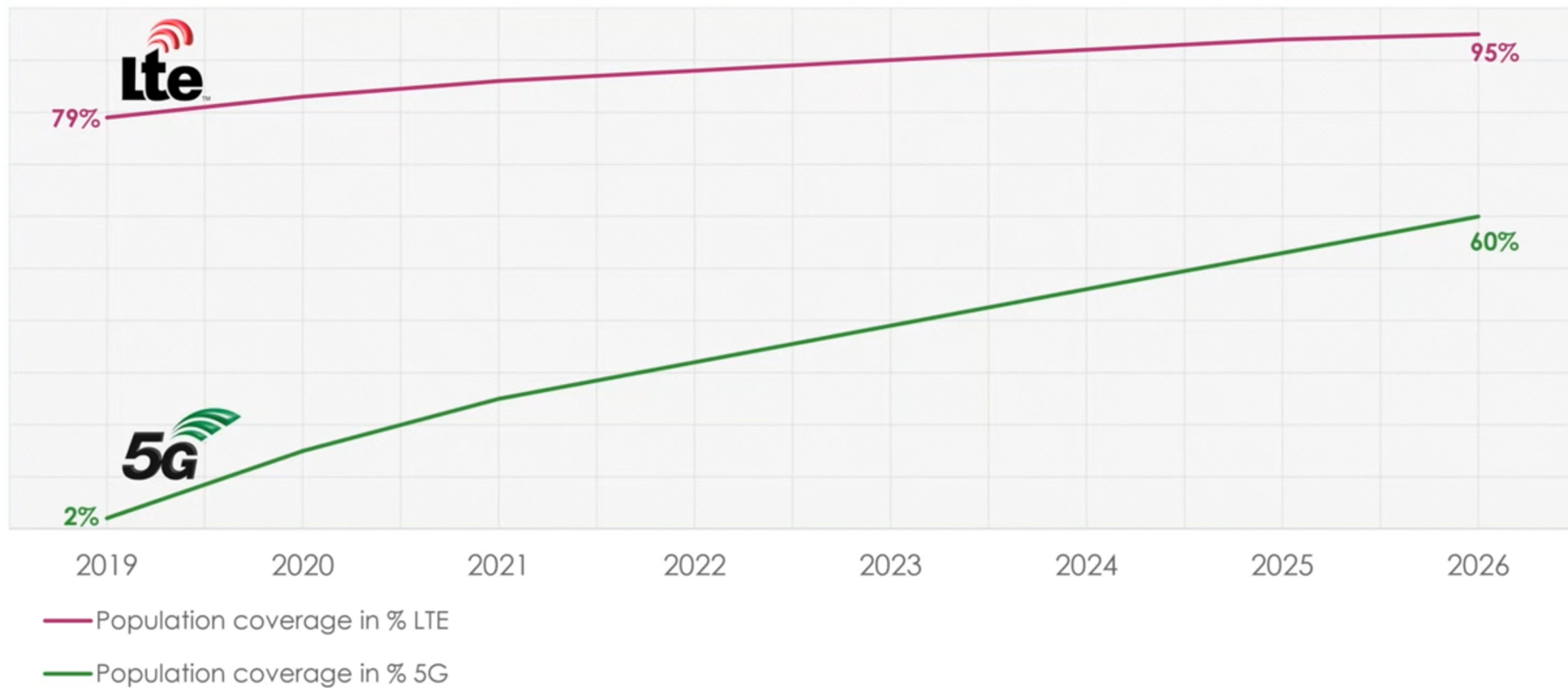
Ventajas LPWAN, 4G y 5G

LPWAN



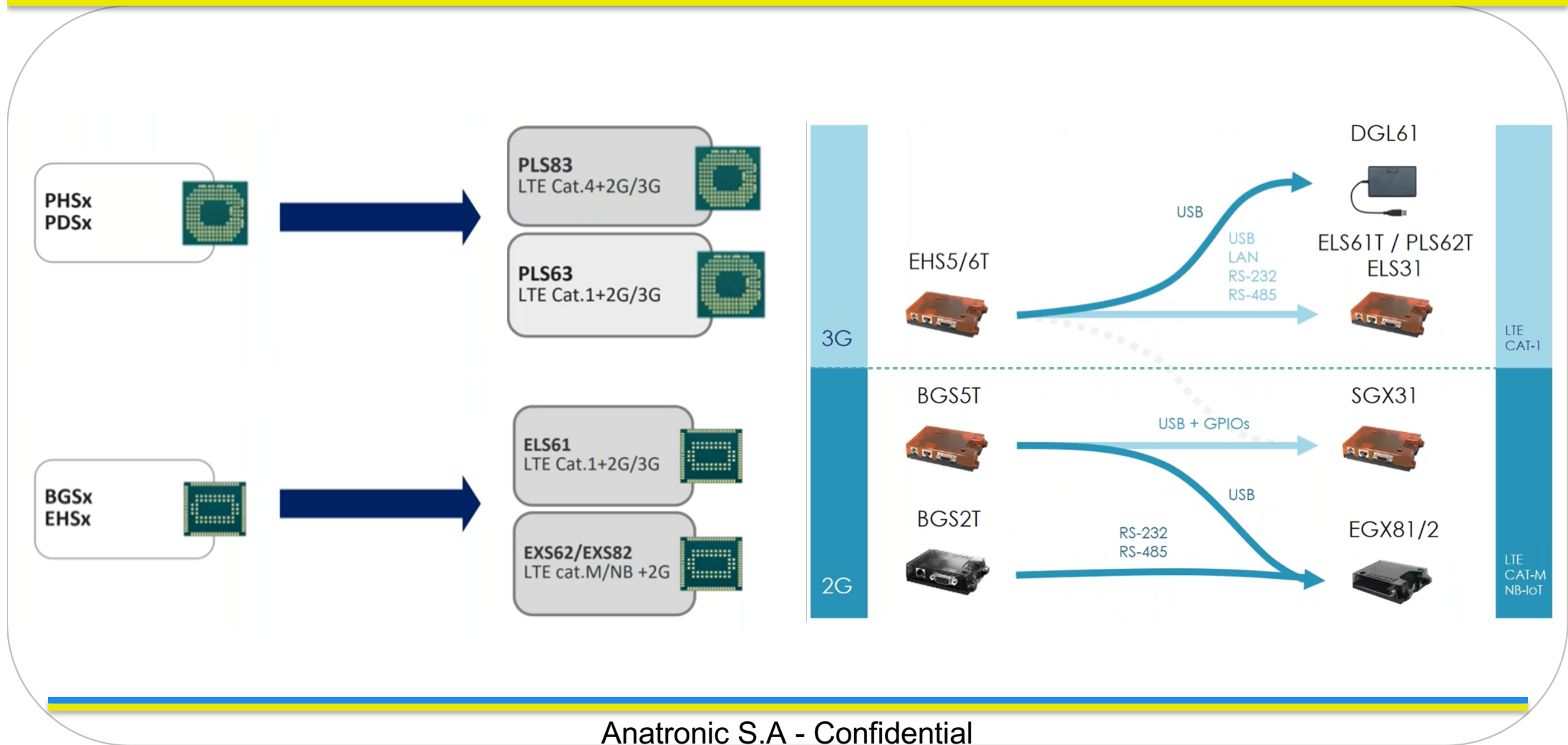
	LTE Cat.M1 (LTE Cat.M)		LTE Cat. NB (NB-IoT)	
SYSTEM BANDWIDTH		1.4MHz CAT M1 5Mhz CAT M2		180/200KHz
DATA RATE (peak) (UL/DL)	☁↕	1Mbps/1Mbps CAT M1 7Mbps/4Mbps CAT M2	☁↕	63kbps / 27kbps CAT NB1 158kbps/124kbps CAT NB2
COVERAGE / PENETRATION	📶	20/23dBm	📶	20/23dBm +14dBm CAT NB2
LATENCY	🕒	10ms to 4s	🕒	1.4s to 10s
MOBILITY	🚚	Connected mobility with some limitations (inter freq. handover)	🚶	limited, changing cells without handover
VOICE	📞	restricted voice for simple use case	1100 1010 0101	no voice, data only
BATTERY LIFE	🔋	extended with PSM or eDRX	🔋	extended with PSM or eDRX
ANTENNA	📡	single Antenna	📡	single Antenna
APPLICATION	Ⓞ <100 kB	FOTA capable	Ⓞ <1 kB	Incr. FOTA only







Migración de Módulos y Terminales



Cinterion® PLS63 Series

LTE Cat. 1 with 2G/3G fallback for global and regional IoT connectivity



Global and Regional LTE coverage with fallback options

- | LTE Cat 1, Global and multiple Regional variants with latest network bands grouping
- | 3G and 2G fallback



Fully Featured modem implementation

- | Integrated IP connectivity
- | VoLTE and CS voice
- | Thales extended set of AT commands



Lower Total Cost of Ownership

- | Embedded GNSS
- | Embedded SIM



State of the art security

- | Secure boot
- | Secure key store
- | Key life cycle management



Easy Connectivity and Lifecycle Management

- | Secure enrollment toward main cloud platforms
- | Remote update and device management

General Features

- | 3GPP Rel.9 Compliant Protocol Stack
- | FDD-LTE: bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 19, 20, 26, 28, 66
- | TD-LTE: bands 38, 40, 41
- | UMTS (WCDMA/FDD): bands 1, 3, 2, 4, 5, 6, 8, 19
- | Quad Band GSM: 850, 900, 1800, 1900 MHz
- | Integrated GNSS support (GPS/BeiDou/GLONASS/Galileo)
- | SIM Application Toolkit, letter classes b, c, e with BIP and RunAT support
- | Control via standardized and extended AT commands (Hayes, TS 27.007 and 27.005)
- | Embedded IP stack with IPv4 and IPv6 support
- | TCP/IP stack access via AT command and transparent TCP/UDP services
- | Secure Connection with TLS/DTLS
- | Internet Services TCP/UDP server/client, DNS, Ping, HTTP, SMTP, FTP client
- | LGA pad soldering mount, MSL3
- | Supply voltage range: 3.0 - 4.5 V
- | Dimension: 33 x 29 x 2.6 mm
- | Operating temperature: -40°C to +85°C
- | RoHS compliant



Interfaces

- | Power Supply for Baseband, Radio Domain
- | Pads for RX-Diversity /MIMO Antennas
- | Pads for GNSS antenna
- | USB 2.0 interface up to 480 Mbps
- | High speed serial modem interface ASCO
- | 16 GPIO lines shared with DSR, DTR, DCD (all ASCO), ASC1 (RXD, TXD, RTS, CTS), SPI, Fast-Shutdown, Network-Status-Indication, PWM, Pulse-Counter lines, TX-Indicator, 700MHz-Indicator
- | ADC and I2C interface
- | Digital audio interface (PCM and I2S modes)
- | Dual UICC and U/SIM card interfaces 1.8V/3V
- | Lines for Module-On and Reset
- | DAI
- | SGMII

Cinterion® PLS83-W

LTE Cat.4 with 2G/3G fallback for global and regional IoT connectivity



Global and Regional LTE coverage with fallback options

- LTE Cat 4, Global and multiple Regional variants with latest network bands grouping
- 3G and 2G fallback



Fully Featured modem implementation

- Integrated IP connectivity
- VoLTE and CS voice
- Thales extended set of AT commands



Lower Total Cost of Ownership

- Embedded GNSS
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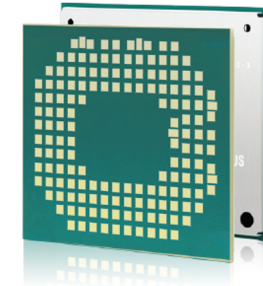


Easy Connectivity and Lifecycle Management

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- FDD-LTE: bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 19, 20, 26, 28, 66
- TD-LTE: bands 38, 40, 41
- UMTS (WCDMA/FDD): bands 1, 2, 4, 5, 6, 8, 19
- Quad Band GSM: 850, 900, 1800, 1900 MHz
- Integrated GNSS support (GPS/BeiDou/GLONASS/Galileo)
- SIM Application Toolkit, letter classes b, c, e with BIP and RunAT support
- Control via standardized and extended AT commands (Hayes, TS 27.007 and 27.005)
- Embedded IP stack with IPv4 and IPv6 support
- TCP/IP stack access via AT command and transparent TCP/UDP services
- Secure Connection with TLS/DTLS
- Internet Services TCP/UDP server/client, DNS, Ping, HTTP, SMTP, FTP client
- LGA pad soldering mount, MSL3
- Supply voltage range: 3.0 - 4.5 V
- Dimension: 33 x 29 x 2.6 mm
- Operating temperature: -40°C to +85°C



Interfaces

- Power Supply for Baseband, Radio Domain
- Pads for RX-Diversity /MIMO Antennas
- Pads for GNSS antenna
- USB 2.0 interface up to 480 Mbps
- High-speed serial modem interface ASC0
- 16 GPIO lines shared with DSR, DTR, DCD (all ASC0), ASC1 (RXD, TXD, RTS, CTS), SPI, Fast-Shutdown, Network-Status-Indication, PWM, Pulse-Counter lines, TX-Indicator, 700MHz- Indicator
- ADC and I2C interface
- Digital audio interface (PCM and I2S modes)
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- Lines for Module-On and Reset
- DAI
- SGMII


Cinterion® EXS82/62 Wireless Module Platform

LTE-M, NB-IoT and 2G connectivity




-  **5G** LTE-M NB-IoT 2G*)


-  **Integrated SIM**


-  **Advanced Power Management System**


-  **Embedded IP Stack**

-  **Incremental FOTA Updates**

-  **Embedded Processing**

-  **State of the Art Security**

-  **Multi Design Capability (LGA)**

-  **Secure Cloud Enrollment**

General Features

- | FDD-LTE Bands 1, 2, 3, 4, 5, 8, 12, 13, 14, 18, 19, 20, 25, 26, 27, 28, 66, 71, 85.
- | Quad-Band GSM: 850, 900, 1800 and 1900 MHz (*)
- | Integrated GNSS support (GPS/BeiDou/Galileo/GLONASS)
- | Compatible with Cinterion® Industrial module footprint
- | SIM Application Toolkit with BIP
- | Control via standardized commands (Hayes, TS 27.007 and 27.005) and Cinterion® AT commands
- | Embedded IPv4 and IPv6 TCP/IP stack access via AT command and transparent TCP/UDP services
- | Internet Services: TCP server/client, UDP client, DNS, Ping, HTTP client, FTP client, MQTT client
- | Secure Connection with TLS/DTLS
- | Supply voltage range: 2.6-4.8 V
- | Dimensions: 27.6 x 18.8 x 2.3 mm
- | Weight: approx. 2.5 g
- | Operating temperature: -40°C to +90°C

Interfaces

- | Pads for primary LTE antenna and GNSS antenna
- | 2 High-speed 8 line serial interfaces
- | USB 2.0 interface (**)
- | UICC and U/SIM card interface 1.8V
- | SPI, I2C, PWM signal line
- | ADC interface

Special Features

- | Optional eSIM included
- | Firmware updatable via interface and Over the Air (OTA) / incremental FOTA
- | LWM2M support with MODS (Module Services)
- | Best in class power consumption current with eDRX and PSM
- | Advanced Security
- | Embedded Processing (**)

Cinterion® ELS61 Wireless Module

LTE Cat 1 with 2G / 3G fallback Optimized for M2M IoT Solutions



4G Five Band LTE Cat 1

Tri Band 3G HSPA Dual Band
2G GSM

USB 2.0 High Speed compatible

Embedded TCP/IP Stack

Incremental Firmware Update

Java™ embedded

RLS Monitoring (Jamming Detection)

Multi Design Capability (LGA)

Cell ID for On-Demand Positioning

High quality voice support

Specifications

- LTE Cat. 1
DL: max. 10.2 Mbps, UL: max. 5.2 Mbps
- HSPA+ Cat.8 (ELS61-US/USA)
data rates DL: max. 7.2 Mbps, UL: max. 5.76 Mbps
- GPRS Class 12 (ELS61-E)
DL: max. 85.6 kbps, UL: max 85.6 kbps
- SMS text and PDU mode support
- VoLTE⁴ or CSFB^{4,5}

Special Features

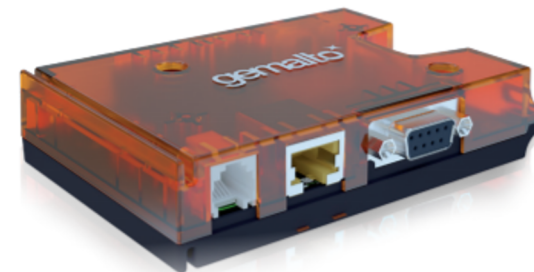
- USB Interface features a composite mode, compliant to Windows, Linux and Mac
- Firmware update via USB and ASC
- Incremental firmware update over-the-air
- High-Quality Voice for handset and handfree operation^{4,5}
- Customer IMEI/SIMLock as variant
- Multiplexer according 3GPP TS 27.010
- Real time clock with alarm functionality
- RLS Monitoring (Jamming detection)
- Informal Network Scan

Interfaces (LGA Pads)

- Power Supply
- Pads for RX-Diversity Antenna
- USB 2.0 HS interface up to 480 Mbps
- High speed serial modem interface ASCO
- 16 GPIO lines shared with DSR, DTR, DCD (all ASCO), ASC1 (RXD, TXD, RTS, CTS), SPI, Fast-Shutdown, Network-Status-Indication, PWM, Pulse-Counter lines
- ADC and I²C interface
- UICC and U/SIM card interface 1.8V / 3V
- Lines for Module-On and Reset

Cinterion® PLS62T-W 4G IoT Gateway

LTE Cat 1 IoT Gateway powered by Java



Multi Band LTE Cat 1



3G HSPA 2G GSM



Ethernet Interface (ELS61T only)



Java embedded



Embedded TCP / IP Stack



Advanced Temperature Management



FOTA configurable & royalty-free



RLS Monitoring (Jamming Detection)



USB 2.0 (PLS62T-W only)



Flexible Mounting

Productname	Region	Ethernet	USB	Java™	Frequency Bands
ELS61T-E LAN	EMEA	•		•	LTE (1,3,8,20,28), 2G Dual Band
ELS61T-US LAN	USA (AT&T)	•		•	LTE (2,4,5,12), 3G (2,4,5)
ELS31T-V LAN	USA (Verizon)	•			LTE (4, 13)
ELS61T-AUS LAN	Australia	•		•	LTE (3,5,8,28), 3G (1,5,8)
ELS31T- J LAN	Japan	•			LTE (1, 18, 19)
PLS62T-W USB	Global		•	•	LTE (1,2,3,4,5,7,8,12(17), 18, 19,20,28), 3G (1, 2, 4, 5, 8, 9, 19), 2G Quad Band
PLS62T-W LAN	Global	•		•	LTE (1,2,3,4,5,7,8,12(17), 18, 19,20,28), 3G (1, 2, 4, 5, 8, 9, 19), 2G Quad Band

Cinterion® PLS62T-W 4G IoT Gateway

LTE Cat 1 IoT Gateway powered by Java

General Features

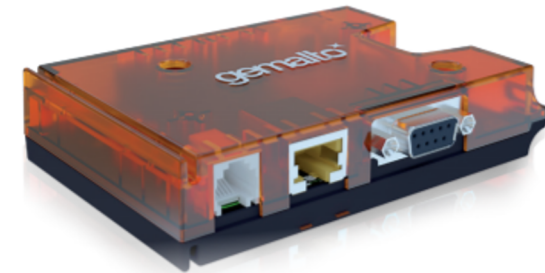
- | 3GPP Rel.7 Compliant Protocol Stack
- | Multi Band LTE Cat1 3G, 2G depending on variant
- | SIM Application Toolkit, letter class "b", "c", "e"
- | Control via standardized and extended AT commands (Hayes, TS 27.007 and 27.005)
- | TCP/IP stack access via AT command and transparent TCP services
- | Secure Connection for client IP services
- | Internet Services TCP/UDP server/client, DNS, Ping, FTP client, HTTP client
- | PoE - Power over Ethernet, optional
- | Supply voltage range 8 – 30 V
- | Dimension: 115 x 86 x 26 mm (incl. connectors)
- | Weight: approx 130g
- | Operating Temperature: -30 °C to +65 °C

Special Features

- | Ethernet interface (NAPT) with optional Power over Ethernet (PoE)
- | Real time clock with alarm functionality
- | Multiplexer according 3GPP TS 27.010
- | RLS Monitoring (Jamming detection)
- | Informal Network Scan
- | Programmable hardware watchdog
- | Flexible mounting concept
- | Integrated FOTA, configurable and royalty free
- | Embedded SIM as an option (MIM)

Java Open Platform (ELS61T / PLS62T)

- | Java™ ME
- | Secure data transmission with HTTPS/SSL
- | Multi-Threading programming and Multi-Application execution
- | 18 MB RAM and 31 MB Flash File System



Interfaces

- | Antenna Connector SMA (female) for GSM/WCDMA
- | Diversity antenna (LTE) SMA connector
- | 20 pin header (Weidmüller) with GPIO's, power, SPI, I²C
- | Mini SIM card reader, 1,8V and 3,0V
- | Embedded SIM as an option (MIM)
- | 2 operating status LED's
- | High speed serial modem interface ASCO
- | Plug-in power supply connector (6-pole Western jack)
- | V.24/ V.28 RS-232 interface, up to 920kbps, autobauding (D-sub 9-pole female socket)
- | Ethernet interface (NAPT)

Cinterion® DGL61-W

LTE Cat. 1, 3G and 2G global connectivity out of the box



Global LTE Cat.1

- | 3GPP Cat.1 with 3G and 2G fallback
- | Single global SKU



Flexible and customizable

- | Embedded Thales eSIM option
- | Custom firmware option
- | Wall-mounting option for long-term device integration



Out-of-the-box connectivity

- | USB 2.0 interface and USB-powered for quick and easy device integration
- | Built-in antenna for simplest installation and best RF performance
- | Type approved



Remote management

- | Firmware over-the-air updates
- | Remote configuration and diagnostics



Industrial-grade performance

- | Rugged design, extended temperature range
- | Long stable lifecycles

General Features

- | Embedded TCP/IP stack with IPv4 and IPv6 support
- | TCP/IP stack access via AT command and transparent
- | TCP/UDP services
- | Secure TCP/IP connectivity, new TSL/SSL engine (TSL1.2)
- | Internet Services TCP/UDP server/client, DNS, Ping, HTTP, SMTP, FTP client
- | Supply voltage range: 5V USB
- | Dimensions: 114.5 x 73.5 x 19.5mm
- | Operating temperature: -25°C to +65°C
- | Integrated Antenna
- | USB cable length: 200mm

Java Open Platform

- | Java ME 3.2 embedded
- | Extended Memory: 18 MB RAM, 30 MB Flash File System
- | Multi-Threading programming and
- | Multi-Application execution

Interfaces

- | Micro-SIM reader, 1,8V and 3,0V
- | Component MIM prepared (optional)
- | 4 operating status LED's
- | USB (B) 2.0 HS (Power over USB)

Special Features

- | Cinterion® IoT Suite Services: firmware updates
- | Driver for Microsoft® 7™, 8™, 10™
- | Driver for Linux
- | Firmware Upgrade via USB and FOTA
- | Flexible wall-mounting concept

Cinterion® EGX81 Efficient IoT Gateway

LTE M, NB-IoT and 2G connectivity



Multiple MTC technologies for global operation

- 3GPP Rel.14 Cat.M1, Cat.NB1, Cat. NB2, 2G
- Single global SKU option

Time to market acceleration

- Simple connect with plug and play interfaces
- Easy to integrate for quick deployment

Highest efficiency for long term operation

- Revolutionary Power Class 5 (20 dBm)
- Efficient eDRX and PSM

State of the art security

- Secure boot
- Embedded eSIM option
- Secure key store with pre-integrated trusted identities

Easy cloud connectivity and remote management

- MQTT(s) for cloud interworking with public IoT clouds
- Remote firmware updates
- Remote configuration and diagnostics

General Features

- LTE Cat. M1/NB1/NB2
- FDD-LTE Bands 1, 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 25, 26, 27, 28, 66
- Quad-Band GSM: 850, 900, 1800 and 1900MHz
- Data only
- SIM Application Toolkit with BIP
- Control via standardized commands (Hayes, TS 27.007 and 27.005) and Gemalto M2M AT commands
- Embedded IPv4 and IPv6 TCP/IP stack access via AT command and transparent TCP/UDP services
- Internet Services: TCP server/client, UDP client, DNS, Ping, HTTP client, FTP client, MQTT client
- Secure Connection with TLS/DTLS
- Supply voltage range: 5 - 30 V
- Dimension: 80 x 55 x 23 mm (excluding connectors)
- Operating temperature: -30°C to +75°C
- Weight 65g

Interfaces

- Antenna Connector SMA (female)
- Mini-SIM card reader, 1.8V and 3.0V
- Plug-in power supply connector (6-pole Western jack @ EGX81 RS232 variant)
- V.24 / V.28 RS-232 interface (D-sub 9-pole female socket) @ EGX81 RS232 variant)
- 6 pin header with RS485 interface, power and ignition/reset @ EGX81 RS485 variant
- Operating status and Watchdog operation indication LED's

Special Features

- Cinterion® IoT Suite Services: software updates, trusted identity
- Driver for Windows® 7 / Windows® 8 / Windows 10
- Driver for Linux
- Firmware update via serial interface
- Real time clock with alarm functionality
- Flexible mounting concept (DIN rail mounting, C-rail mounting, Screw fixing, use of cable ties)
- Programmable hardware watchdog

Integración en
la Nube





The Things

Monitor, collect, send and receive data.

IoT Gateway

Receives massive, disparate data
Aggregates, summarizes, synchronizes data
Sends pre-processed data to the cloud.

The Cloud

Transforms data into actionable intelligence.

Componentes típicos de un sistema IoT



1. Choose communications hardware suitable for location of the device. Design a communication protocol

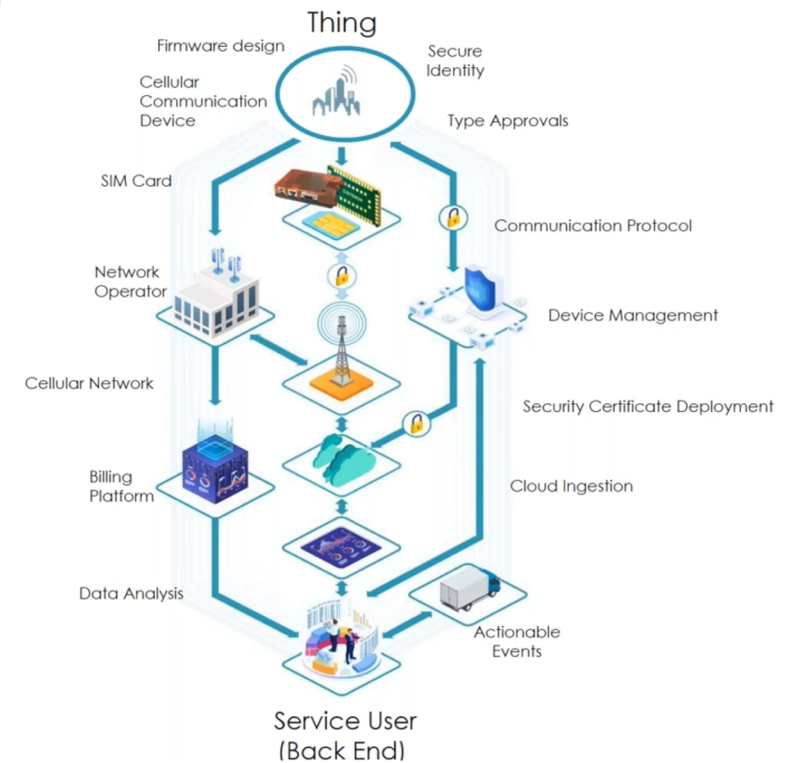
2. Negotiate airtime plan with mobile network operator and acquire SIMs for the device

3. Manage the lifecycle of the SIM card and manage individual airtime consumption

4. Find a suitable cloud database for storing and managing data from the device

5. Design an application to visualise the data. Monitor and manage the connected device.

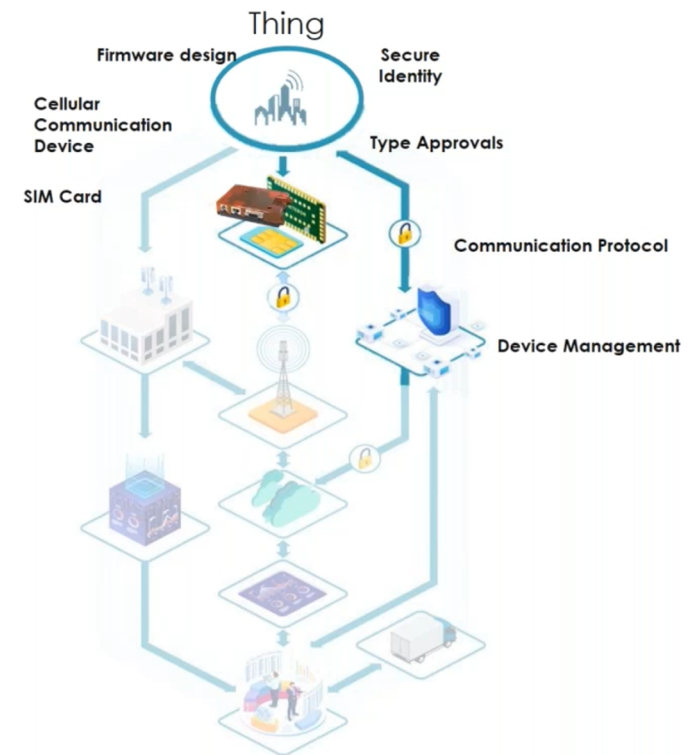
6. Manage security certificates, the identity of the device and enrolment into the cloud platform



Componentes típicos de un sistema IoT

“Thing Design”

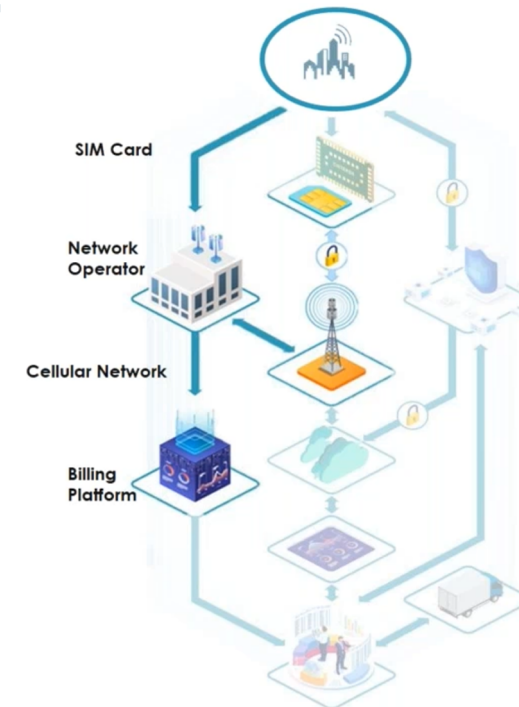
- Hardware & Embedded Firmware
- Protocolos de comunicación
- Gestión del dispositivo
- Seguridad y Encriptado



Componentes típicos de un sistema IoT

“The Carrier”

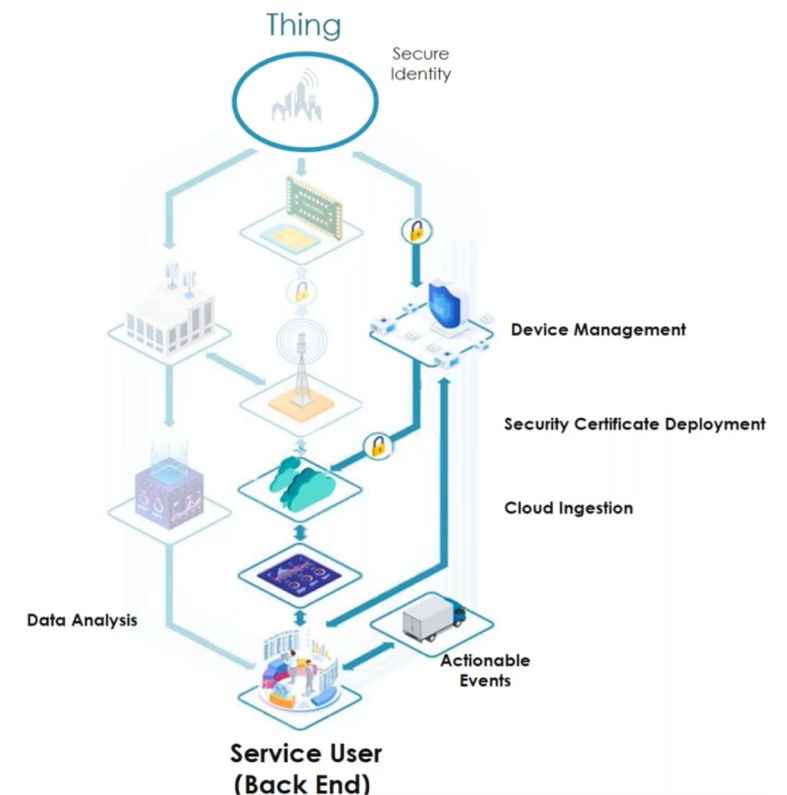
- Operador de la red celular
- Facturación
- Cobertura y Roaming
- Activación y desactivación



Componentes típicos de un sistema IoT

“Cloud Integration”

- Identidad y aprovisionamiento en la nube
- Certificados de Seguridad
- Análisis de Datos
- Integración de “third parties”

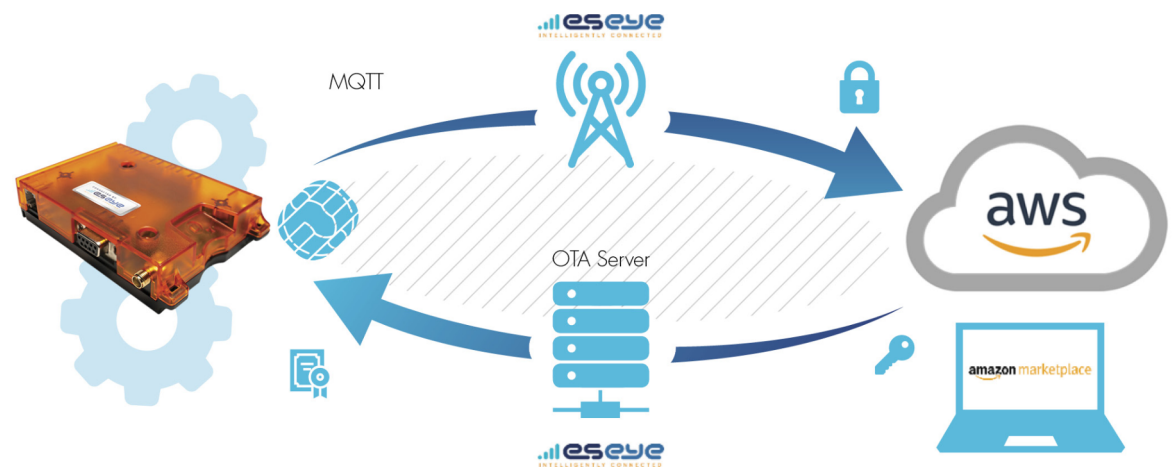


Conexión a la nube

“Simplificación IoT”

- Entregar un dispositivo completo confiable, seguro y escalable en una solución en la nube
- Simplificar el desarrollo IoT
- Reducir drásticamente el “time to market”
- Dirigido a despliegues globales

Uso de estándares de Conectividad y Seguridad



Conexión a la nube

Integración automática con AWS

PLS62T



aws
qualified device
Internet of things

Embedded Intelligence

- Automatic AWS Cloud Provisioning
- Simple MQTT AT commands
- Customisable Java Engine

Global Connectivity

- No airtime package required
- MQTT Message based connectivity via Amazon marketplace

USB or RS232 interface

- I2C, SPI, A/D, GPIO



Complete Device to Cloud Solution

Automated secure cloud ingestion to AWS IoT
No IoT experience required



Message Based Billing

MQTT message bundles through Amazon Marketplace. Transparent connection to 600+ mobile operators



Instantly Scalable

From Prototype to production ready deployment.



All-in-one LTE cat.1 solution

Future proof design with global LTE footprint with 2G and 3G fallback



Plant Equipment



Industrial



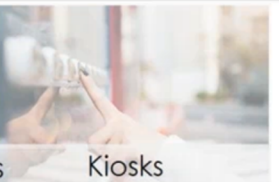
Environmental



Energy



Vending Machines



Kiosks

Conexió



1. Buy an Intelligent Cloud Connect enabled IoT terminal and Eseye AnyNet Secure SIM.



2. Open an AWS account



3. Sign up Eseye IRIS Integration Software & MQTT message bundle



4. Configure User Permissions, Roles and policies



5. Give 'thing' a name and load into AWS Things Repository along with SIM identity

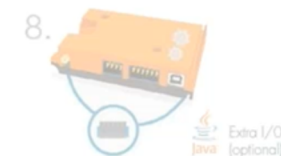


6. Switch it on!
 Credentials delivered OTA via Eseye server.
 Access URL
 Public Certificate
 Root CA
 Key



7. Simply send some MQTT IoT messages and see them appear in your AWS console.

3 x MQTT Commands



8. Optional:- Embed further applications or sensors



Muchas gracias