

A nighttime photograph of a city street with tall buildings and light trails from cars, creating a sense of motion and connectivity.

CONNECTING A SMARTER FUTURE



Conquering the Special Challenges of Cellular IoT Devices

IoT Slam - November 2016

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1.5 Billion
Internet of Things
(IoT) Devices
with Cellular
Subscriptions
By 2021

Cellular Modules – IoT's Big Enabler



- Pre-tested modem module
- Reduced certification testing
- No chipset licensing requirements
- Perfect for low-to-medium volume
- Lots of flavors and options
- Faster time to market

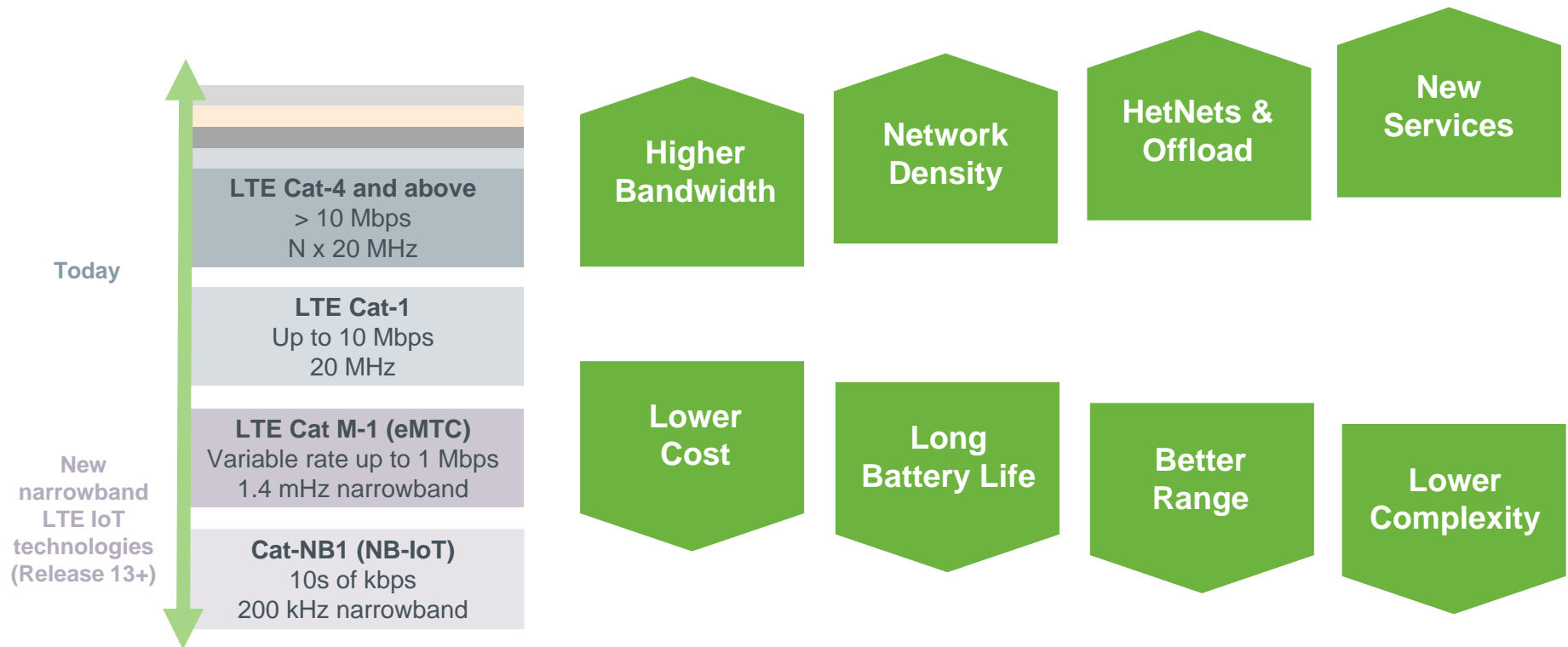


Herding Cats

LTE Cat 1, Cat M1, Cat NB1



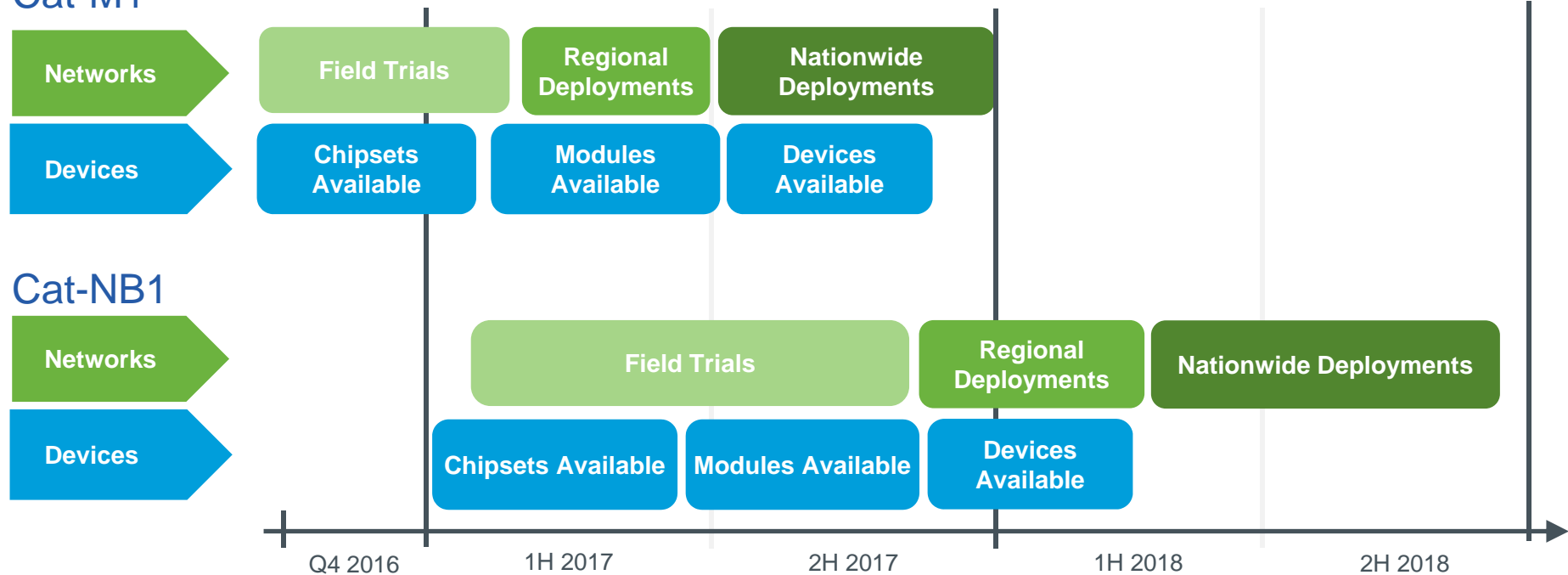
Herding Cats: LTE Cat 1, Cat M1, Cat NB1



How Soon?



Cat-M1



Sources: Fierce Wireless, Re-think IoT, Press releases

“ It isn't shiny new protocols or
'billions' of devices that matter most

It's that Cellular is
welcoming outsiders, en masse,
to just light up their apps

”

Device Anxiety



Does my connectivity work reliably?

Will I be embarrassed by a hacking scandal?

Will I harm the network?

Do I have all the IoT protocols working?

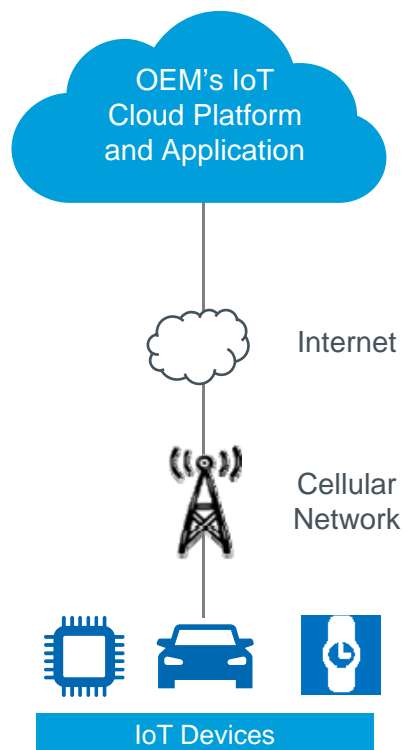
Will I connect in every country I might ship to?

Will my battery cope with a weak cell signal?



Special Challenge #1

Testing Cellular on a Live Network



I can't see the packets!

Was that failure real,
or just a network glitch?

My developers are not where
my network is!

Do network settings affect
power usage?

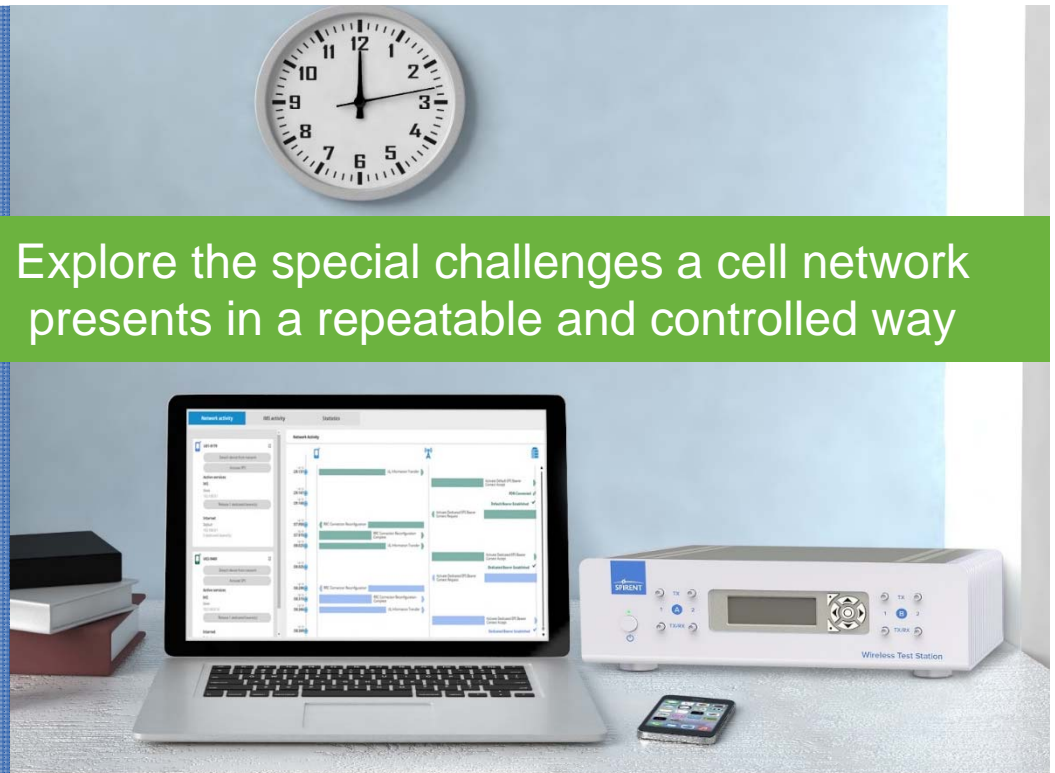
Bringing Cellular into the Lab



The Next Big Thing is Small

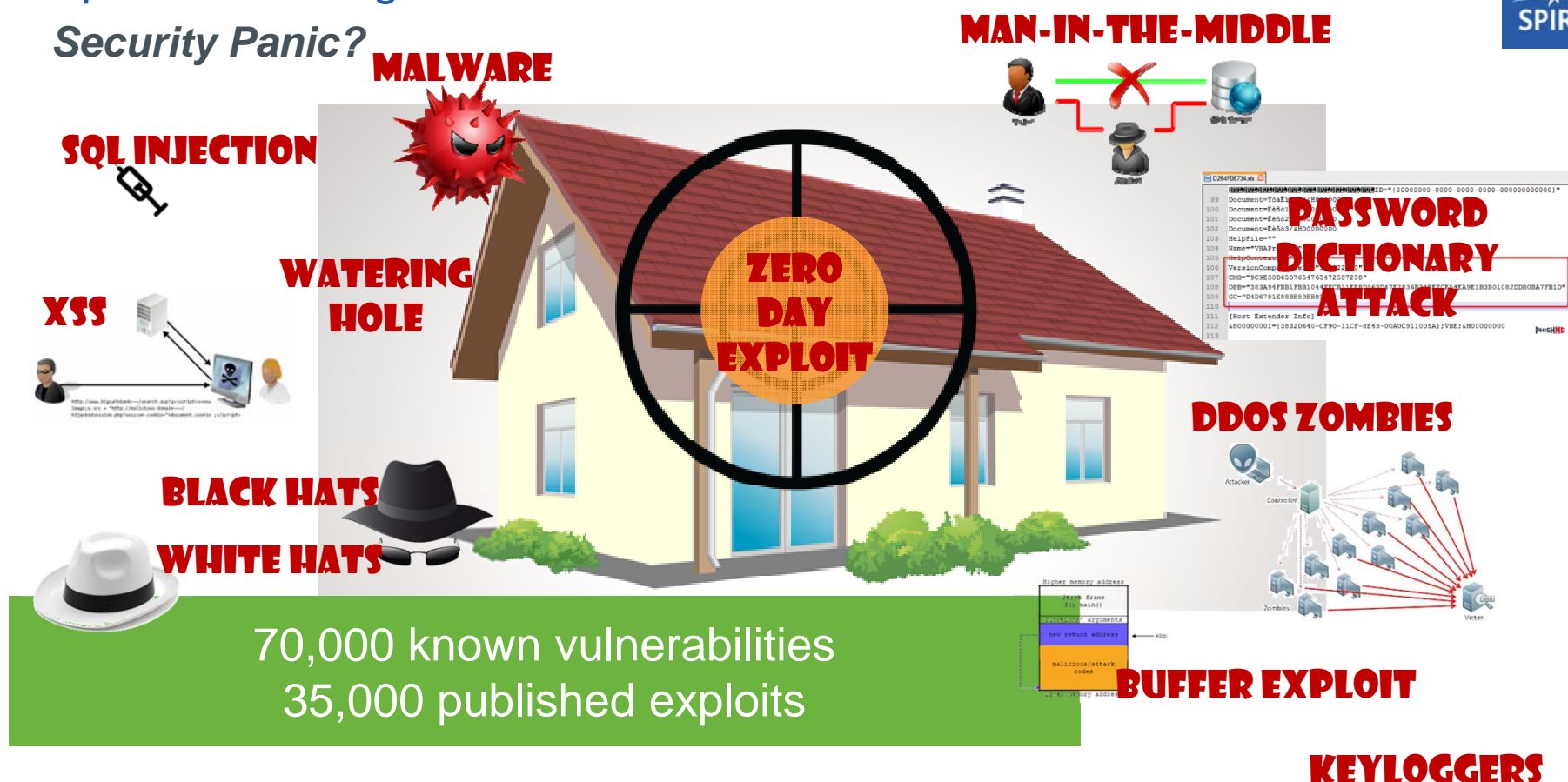
- Cost effective solution for IoT developers
- Simulate world-wide carrier networks
- Create realistic network conditions
- Cloud Connected for end-to-end test
- Fast unbox-to-connected experience
- Intuitive UI doesn't require wireless experience

Explore the special challenges a cell network presents in a repeatable and controlled way



Special Challenge #2

Security Panic?



Three types of attack



“Serious Hacking”

Social Engineering

Policies

Vulnerable Devices



Top user names	Top passwords
root	admin
admin	root
DUP root	123456
ubnt	12345
access	ubnt
DUP admin	password
test	1234
oracle	test
postgres	qwerty
pi	raspberry

symantec.com

When you're designing, *maybe* you don't need to build a fortress, but you should *at least* lock the front door*

**and if you need a fortress, get a professional!*

Security for Cellular IoT Devices

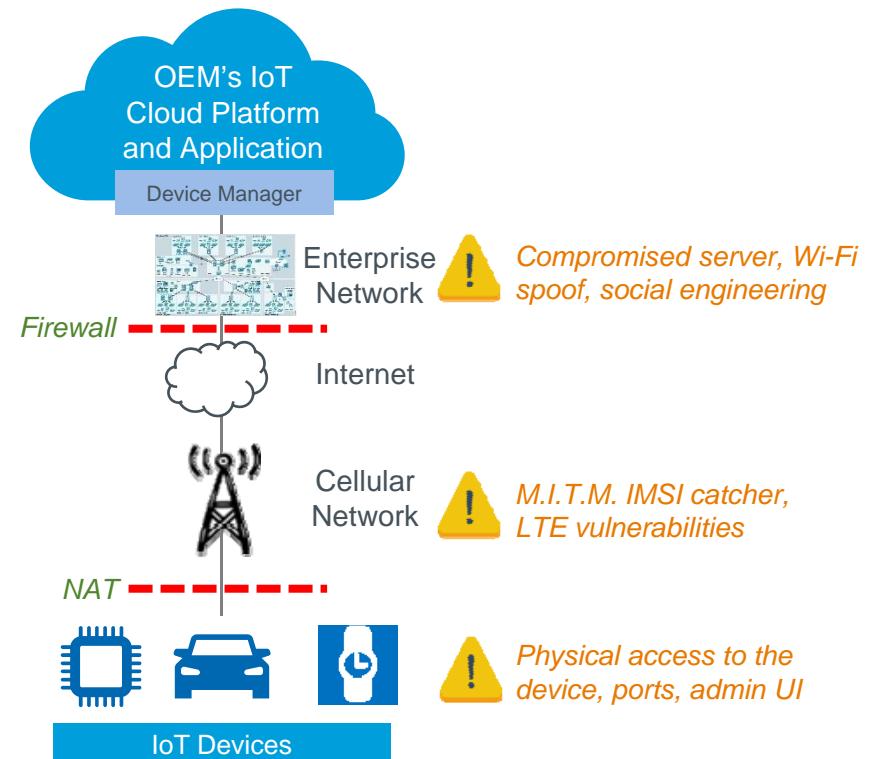
“4G is much safer than using a public or untrusted Wi-Fi network. If you don't trust the network, turn off Wi-Fi on your phone and use 4G. It's a lot easier to sniff traffic on a Wi-Fi network than a cell network, and most people aren't lugging around the equipment to do so.”

Really?

Security for Cellular IoT Devices



“At the end of the day,
it's a given that the
device is accessible and
that its packets are
sniffable”



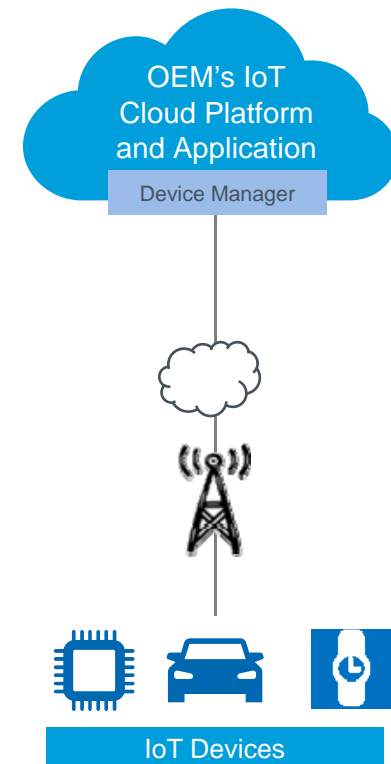
Security for Cellular IoT Devices



Secure the communication between the device and/or gateway and the device manager

How do you “Lock the Doors”?

- Don't use default credentials
- Don't leave excess services open
- Don't use unsecured Telnet & HTTP
- Require complex passwords
- Don't *send* data in clear text
- Don't *store* data in clear text
- Be careful about Device ID & Authentication



Ensuring the Doors are Locked



- Start with managed remote scanning using state-of-the-art vulnerability techniques
- Combine automated scanning with manual validation and with penetration testing
- For demanding applications:
 - Examine cellular and local interfaces
 - Perform code analysis
 - Analyze encryption implementations and certificate methodologies
 - Ensure firmware updates can't themselves be compromised

Engage a team of security specialists to certify your design



The 10 Year Battery



LTE Chipset Touts 10-Year Battery Life

everything**RF**

Innovative Power Saving Mode Enables 10 Year Battery Life
for LTE IoT Chipsets

electropages

World's first cellular NB-IoT module offers 10-year battery life



Smart Cities, 10-Year Battery Life and LPWA to Spur IoT
Momentum in 2016

oil field sensors
farming sensors
city trash cans
taxi call stands
fire hydrants
parking sensors
oil tank sensors
water meters
pallet tracking
wearables

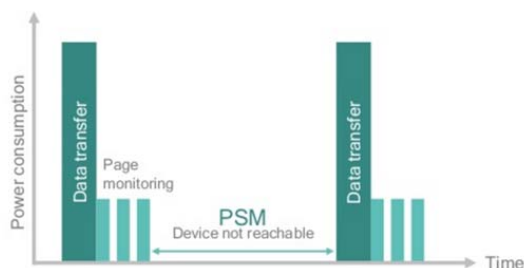
Special Challenge #3

Is The 10 Year Battery a Myth?



Delivering multi-year battery life

Devices wake up on a per-need basis; stay asleep for minutes, hours, even days



Power save mode (PSM)

Eliminates page monitoring between data transmissions
For device-originated or scheduled applications, e.g., smart metering, environmental monitoring



Extended discontinuous receive (eDRx)

Extends time between monitoring for network messages
For device-terminated applications, e.g., object tracking, smart grid

Also features such as reduced complexity and less channel measurements extend battery life

5.2 Power Consumption

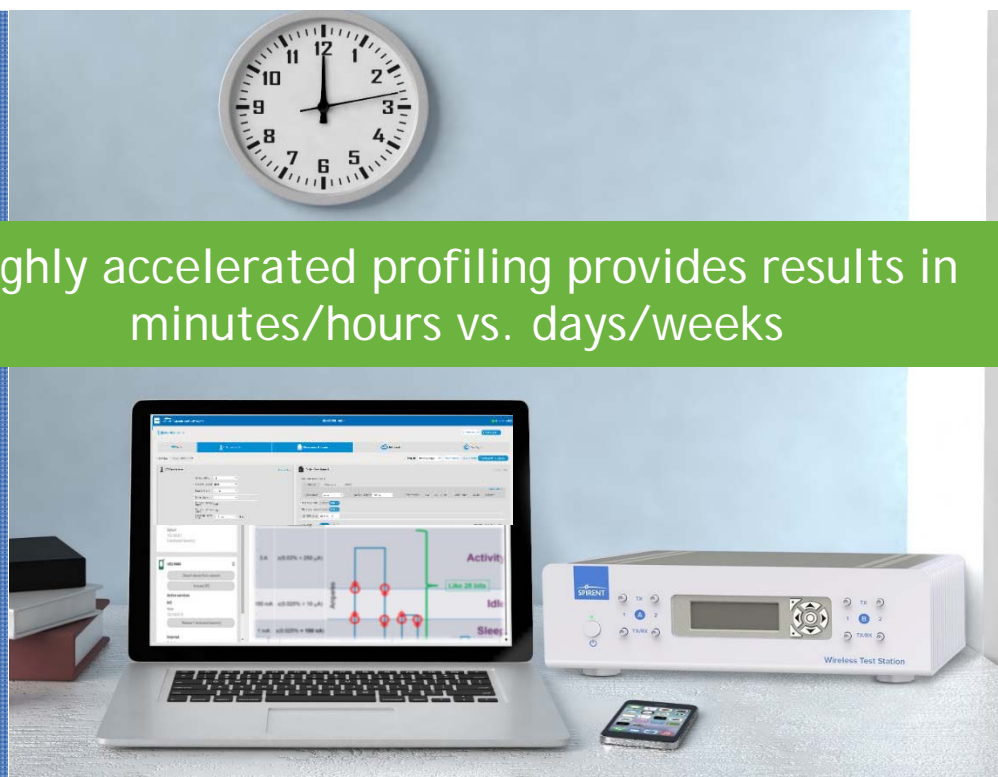
HE910		
Mode	Average (mA)	Mode description
SWITCHED OFF		
Switched Off	40uA	Module supplied but Switched Off
IDLE mode (WCDMA)		
AT+CFUN=1	12.2	Normal mode: full functionality of the module
AT+CFUN=5	1.2	Full functionality with power saving; DRX7; Module registered on the network can receive incoming calls and SMS
IDLE mode (GSM/EDGE)		
AT+CFUN=1	19	Normal mode: full functionality of the module
AT+CFUN=4	16.5	Disabled TX and RX; module is not registered on the network
AT+CFUN=5	0.8	Full functionality with power saving; DRX9 (1.3mA in case of DRX5)
Operative mode (WCDMA)		
WCDMA Voice	152	WCDMA voice call (TX = 10dBm)
WCDMA HSDPA (0dBm)	187	WCDMA data call (Cat 14, TX = 0dBm)
WCDMA HSDPA (22dBm)	494	WCDMA data call (Cat 14, TX = 22dBm)
Operative mode (EDGE)		
EDGE 4TX+2RX		
GSM900 PL5	495	EDGE Sending data mode
DCS1800 PL0	484	
Operative mode (GSM)		
CSD TX and RX mode		
GSM900 CSD PL5	220	GSM VOICE CALL
DCS1800 CSD PL0	167	
GPRS 4TX+2RX		
GSM900 PL5	580	GPRS Sending data mode
DCS1800 PL0	438	

Ensuring Battery Life

Measure under all network conditions

- Catalog application profiles, such as
 - Active transmit and receive tasks
 - Deep sleep mode
 - Listening window
 - Firmware update
 - “Under attack”
- Run each profile against network scenarios
 - Good, marginal and intermittent coverage
 - High and low network loading
 - Exercise the range of DRX/eDRX and PSM configurations and settings

Highly accelerated profiling provides results in minutes/hours vs. days/weeks

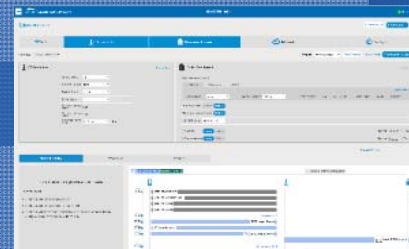


Can Spirent help you and your customers?

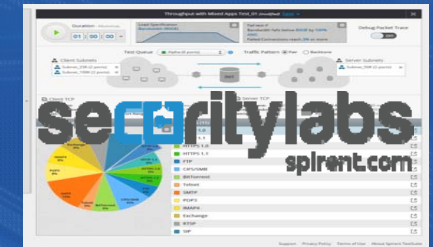
Cost effective lab solution tailored for IoT developers



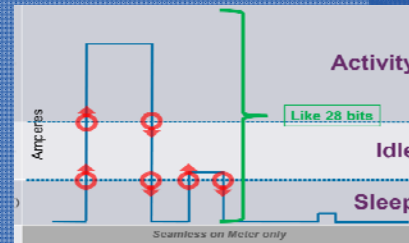
Spirent Elevate® IoT Device Test Solution



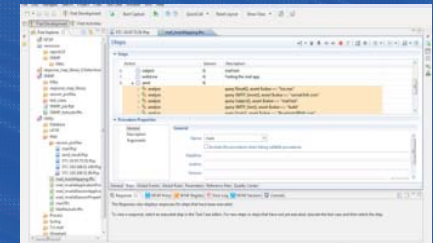
Cell Connectivity



Security Services

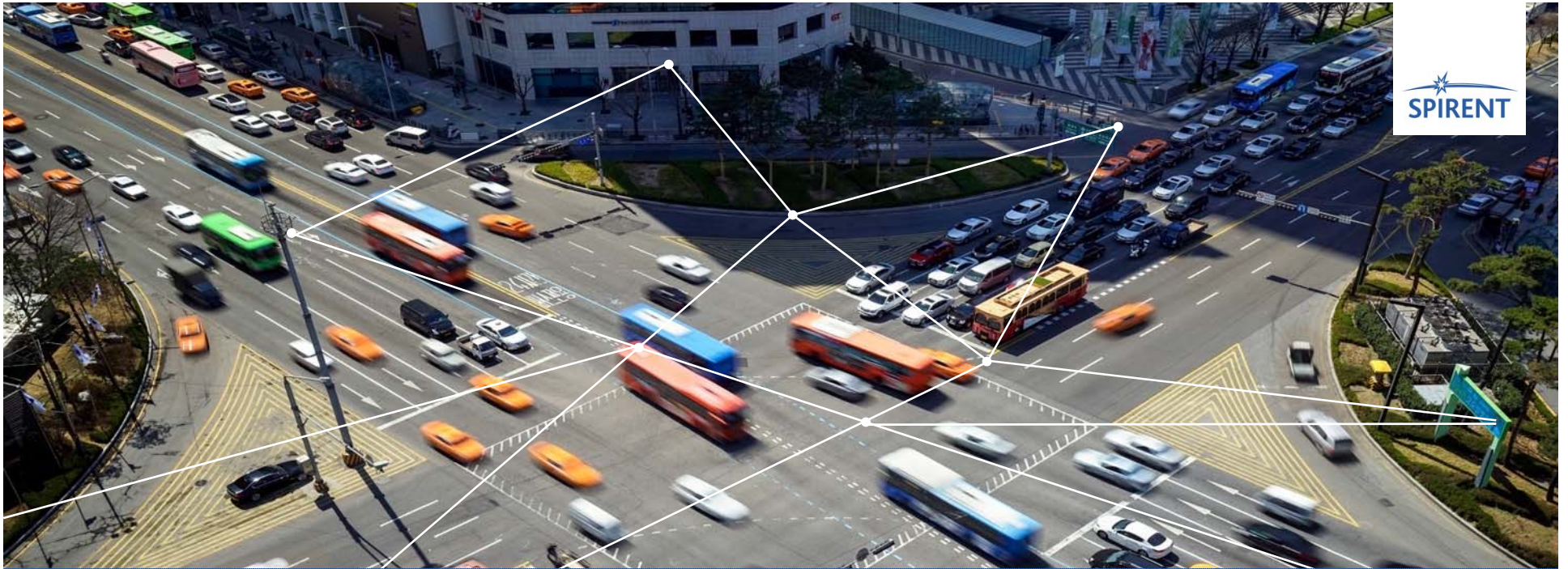


Battery Energy



Carrier Tests

Integrated suite covers major IoT challenge areas
Connectivity | Security | Battery | Carrier Tests



Making IoT Adoption Simple, Secure and Reliable