

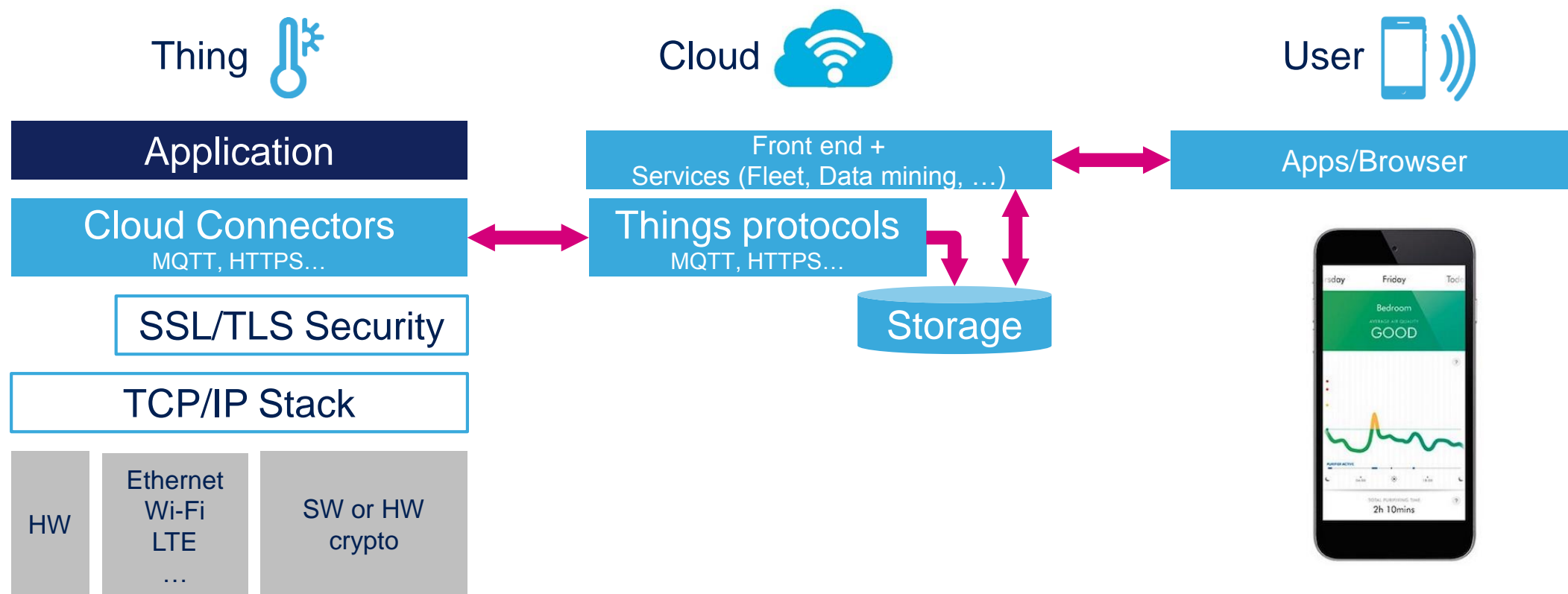
STM32 Cellular to Cloud



Connectivity bricks for Cloud connection 2

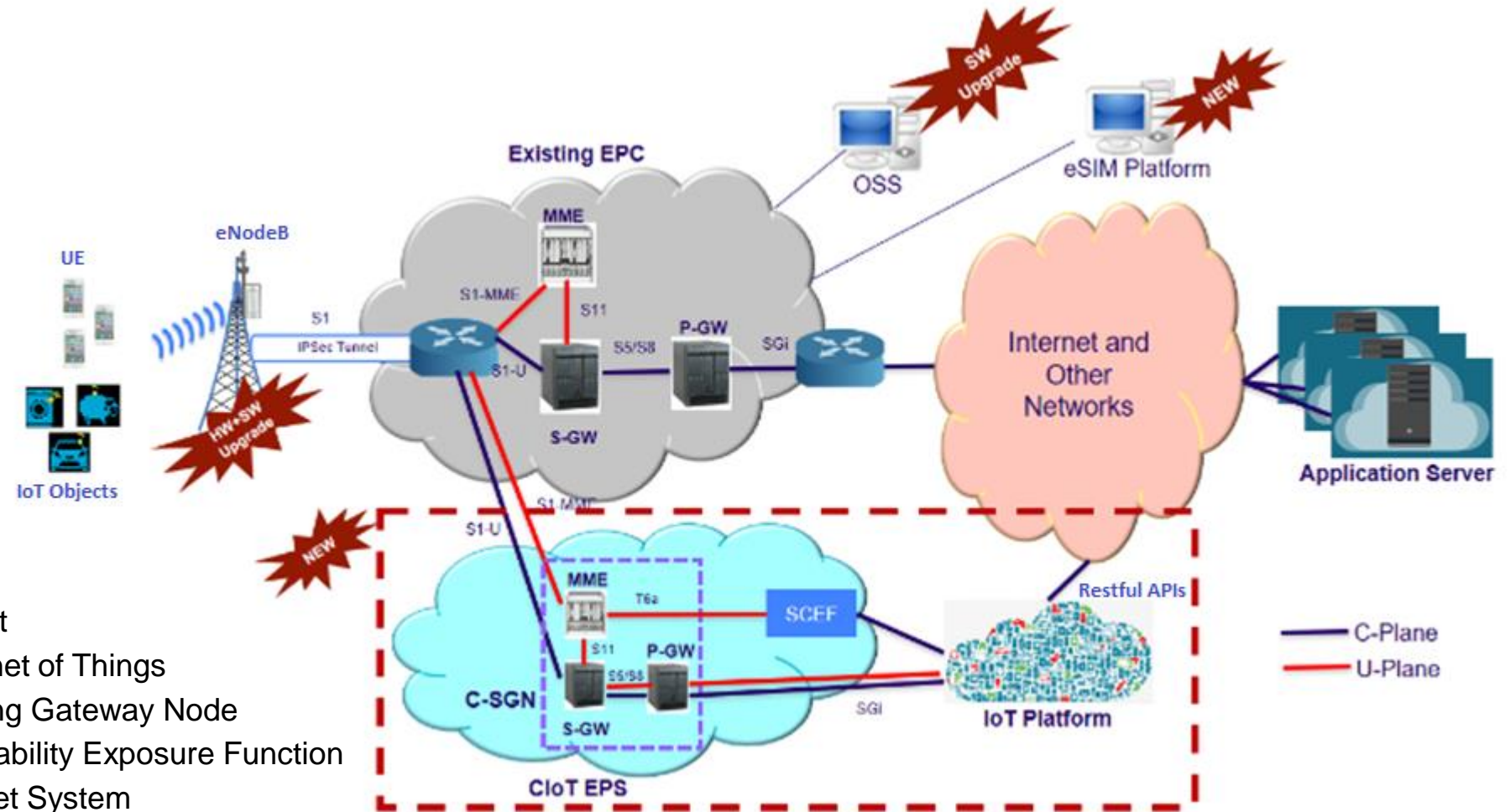
Top technical view: TCP/IP based example

From Thing to Remote User from any location



NB-IoT Deployment

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UE: User Equipment

CloT: Cellular Internet of Things

C-SGN: CloT Serving Gateway Node

SCEF: Service Capability Exposure Function

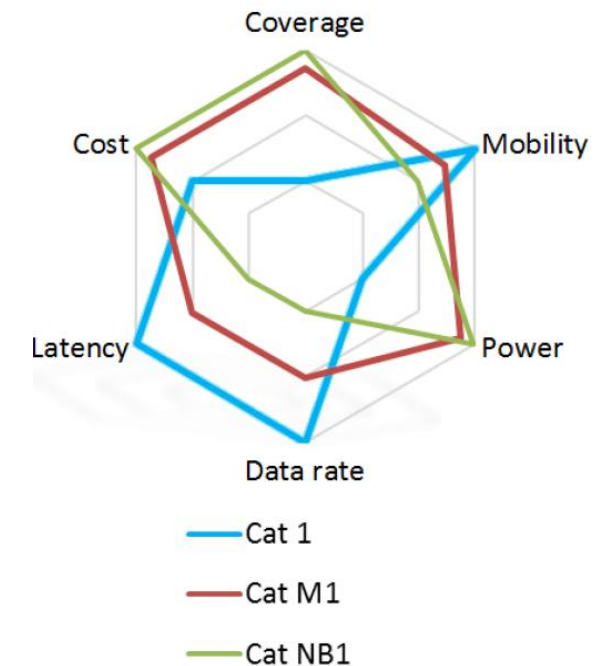
EPS: Evolved Packet System

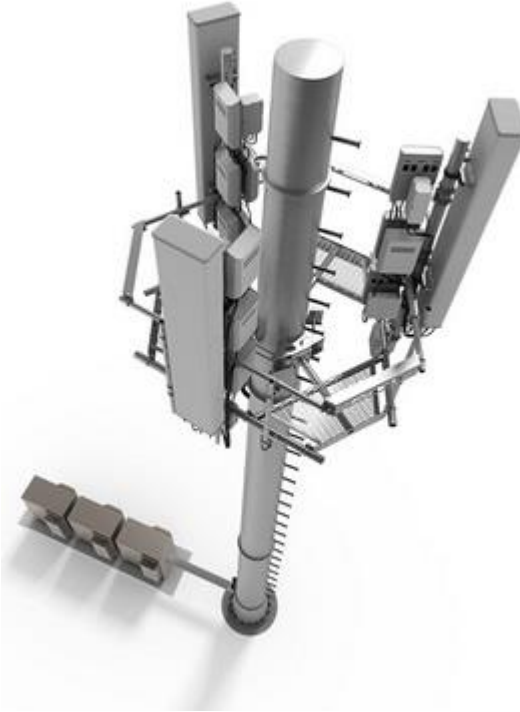
LTE Cat M1 vs NB1

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Cat M1/NB1 is a LPWAN technology for IoT devices to connect directly to a 4G network that extends battery life and coverage while offering enough bandwidth for communication.

	LTE Cat M1 (eMTC)	LTE Cat NB1 (NB-IoT)
Deployment	In-band LTE	In-band & Guard-band LTE, Standalone
Downlink Peak Rate	1 Mbps	50 kbps
Uplink Peak Rate	1 Mbps	50 kbps (multi-tone) 20 kbps (single-tone)
Latency	50 ~100 ms	1.6 ~ 10 s
Number of Antennas	1	1
Duplex Mode	Full / Half Duplex, FDD & TDD	Half Duplex FDD
Bandwidth	1.08 MHz	180 kHz
Transmit Power	20 or 23 dBm	20 or 23 dBm





STM32-C2C

STM32 Cellular to Cloud

STM32 Cellular to Cloud Discovery Pack



STM32



STM32 Cellular to Cloud Discovery Pack



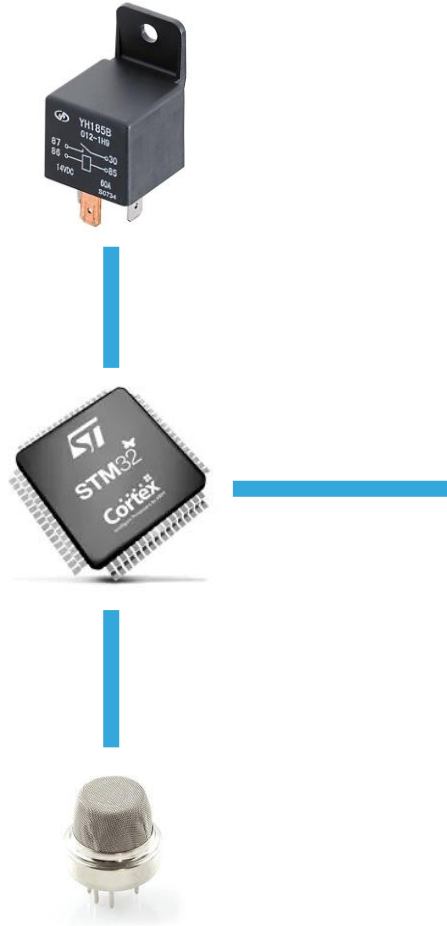
Actuator



Sensor



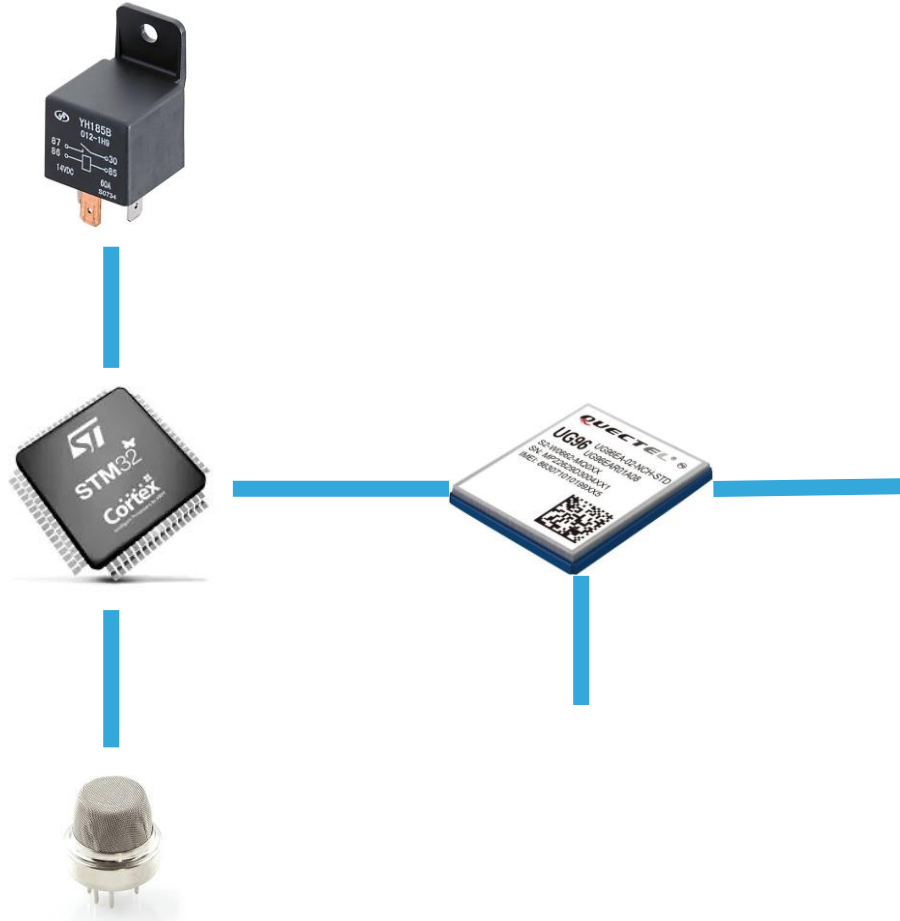
STM32 Cellular to Cloud Discovery Pack



Cellular Modem



STM32 Cellular to Cloud Discovery Pack



Antenna



SIM Card



STM32 Cellular to Cloud Discovery Pack



QUECTEL
Wireless Module Expert



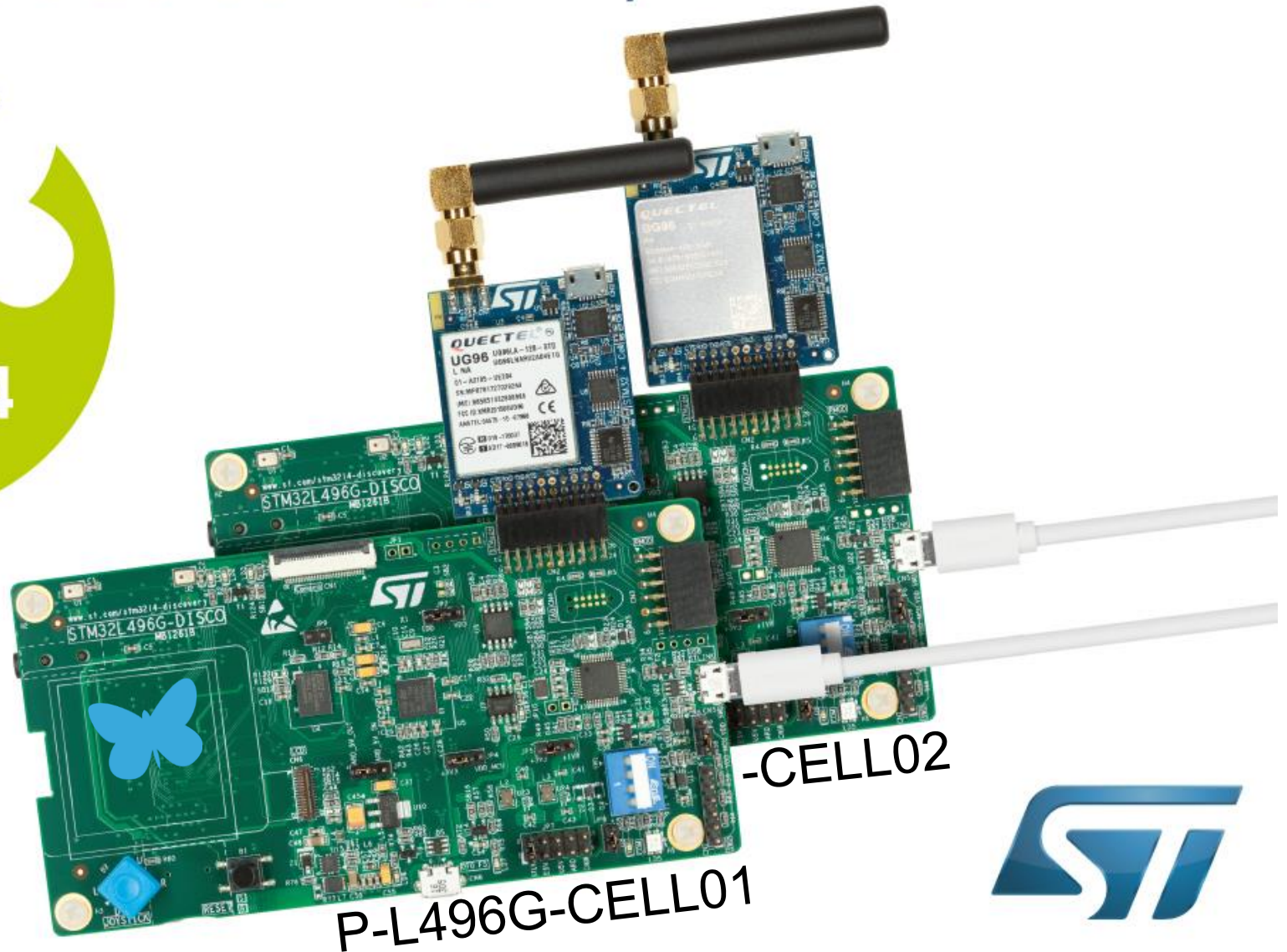
EMnify



P-L496G-CELL01/02 – Cellular to Cloud Discovery Packs
STM32 Turnkey solution for 2G/3G/Cat M1/Cat NB1



STM32 Discovery Packs for cellular-to-cloud connectivity



ST C2C Solutions

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		P-L496G-CELL01	P-L496G-CELL02
MCU control board		STM32L496 Discovery board	
Interface		STMod+	
Cellular board	Modem (Quectel)	UG96 @ 2G/3G	BG96 @ LTE IoT Cat 2G/M1/NB1
	SIM card	Complimentary SIM card with prepaid plan for 90 days from EMnify	from region telco
	SIM socket	Yes	Yes

STM32 C2C Discovery Pack – Out of Box

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www.stm32-c2c.com



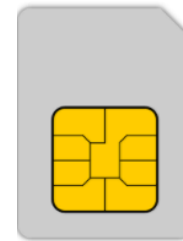
Digital voucher:

- retrieve information about the board
- SIM card activation details
- A list of demos in binaries

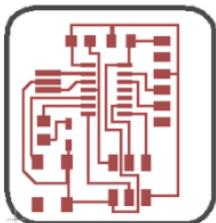


X-CUBE-CLD-GEN

- Drivers
- Middleware
- Applications



Emnify free-trial data plan for 90 days



Schematics



Bill of Material

ST C2C Connectivity Spec

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	CELL01 (UG96)
Frequency Bands	800/850/900/1900/2100MHz@UMTS 850/900/1800/1900MHz@GSM
HSUPA	Release 7 (category 6), Max 5.76 Mbps
HSDPA	Release 7 (category 8), Max 7.2 Mbps
EDGE	Multi-slot Class 33, Max.296Kbps (DL)/Max 236.8kbps (UL)
GPRS	Multi-slot Class 33, Max.107Kbps (DL)/Max.85.6Kbps (UL)
UMTS	Release 99/7, Max.384Kbps (DL)/Max.384Kbps (UL)
GSM	Release 99/4, CSD 14.4Kbps

	CELL02 (BG96)
Cat.M1	Max 375 kbps (DL), Max 375 kbps (UL)
Cat.NB1	Max 32 kbps (DL), Max 70 kbps (UL)
GPRS	Max 85.6 kbps (DL), Max 85.6 kbps (UL)
EDGE	Max 236.8 kbps (DL), Max 236.8 kbps (UL)
Variant for the Global	Cat.M1/Cat.NB1: LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/ B19/B20/B26/B28 LTE TDD: B39 (For Cat.M1 Only) EGPRS: 850/900/1800/1900MHz

STM32 Cellular to Cloud Discovery Pack

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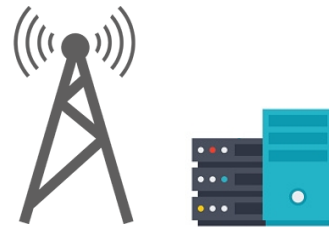
C2C System Diagram

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STM32 Cellular-to-cloud (C2C)
Evaluation board

- Environmental and MEMS sensors
- LED on/off control



Gateway

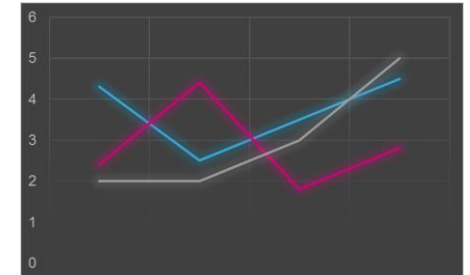


Public Application cloud:

- Grovestreams
- Exosite
- IBM Bluemix

Application Dashboard

- Visualization
- Remote Monitoring & Control



Application terminal

Legacy infrastructure :

- High cost (server etc...)
- Limited cloud selection
- Limited device management
- Limited up/down scalability

Trend

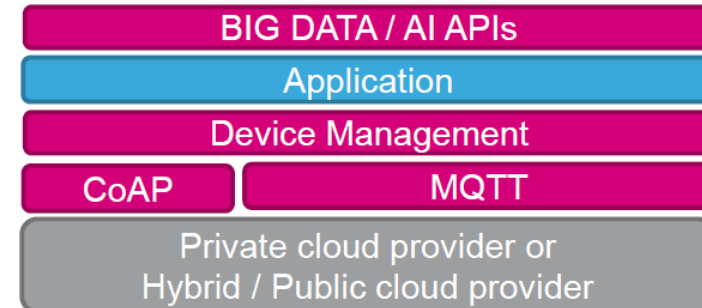
IoT infrastructure

- Based on proven IoT protocols
- Wide range of cloud (AWS, Azure, Alibaba, Baidu...)
- Complete device management solutions
- With Big Data / AI services

Server side



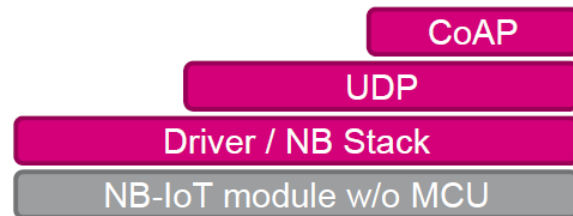
Trend



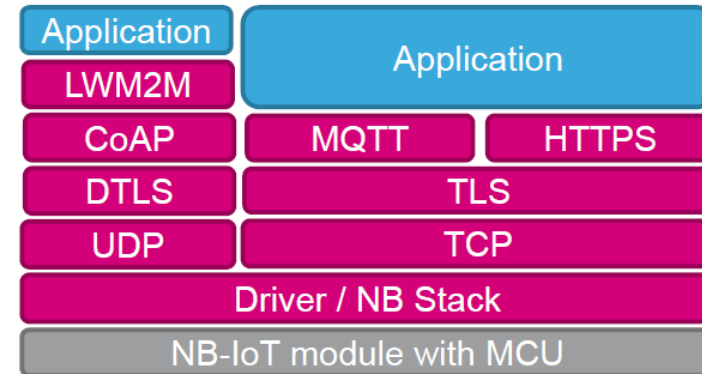
Flexible and interoperable cloud architecture

Node side

Standard module architecture



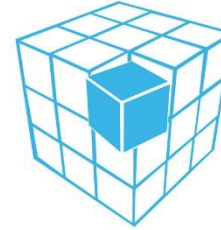
Trend



Flexible module architecture

STM32 C2C Discovery Packs - Software

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Espruino

JavaScript for Things



STM32 C2C Discovery Packs - Cloud Services

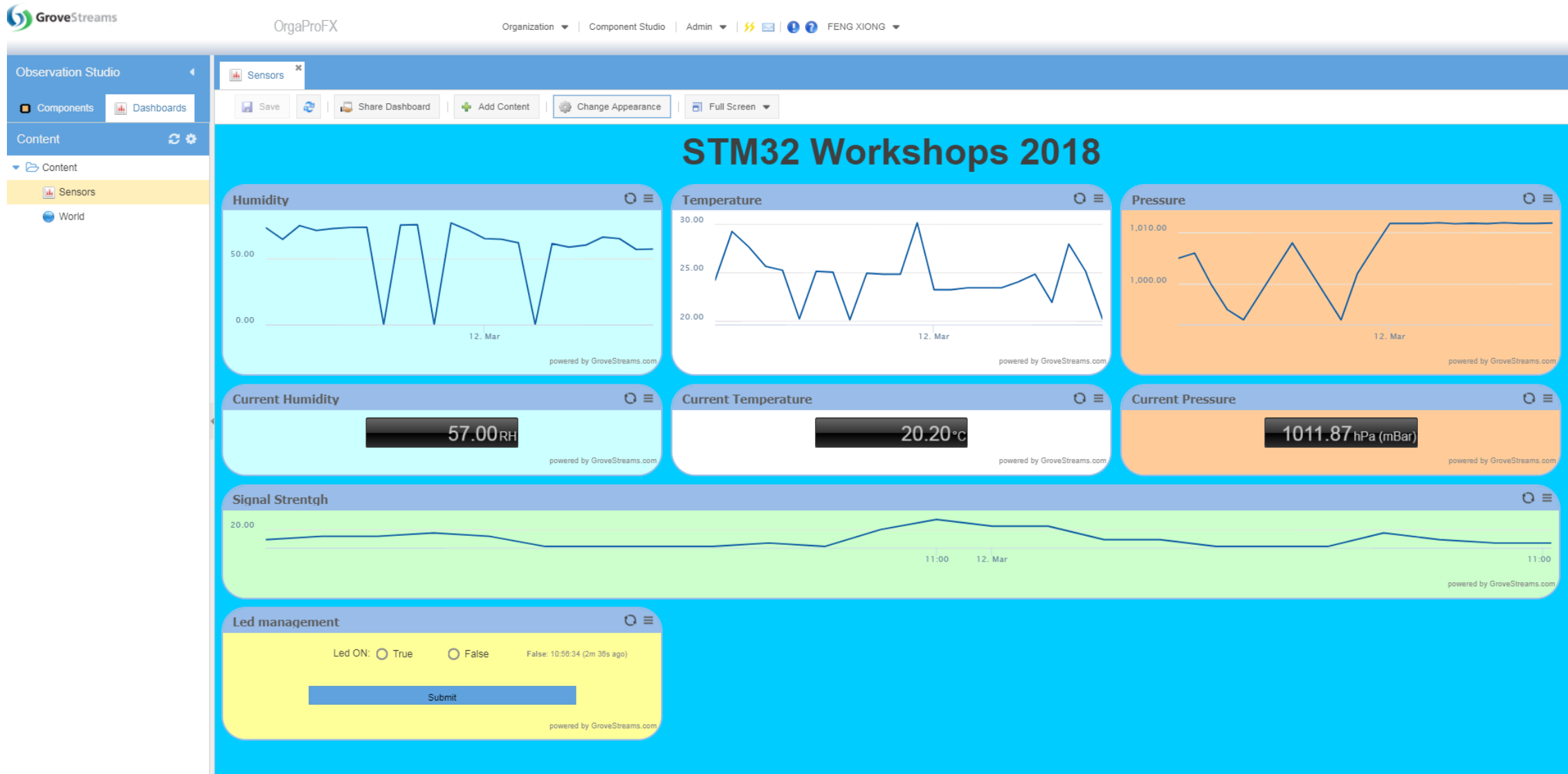
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Aimagin Matlab Blockset Solution
with Thingspeak Cloud support

C2C Demo

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NB-IoT Solutions

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Water meter



Smart parking



Smart lamp



Gas meter



Asset tracking



Smart sensor



Electrical appliance



Smart lock



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Thank you!



Releasing Your Creativity