

THE DEVELOPER'S CONFERENCE

IoT com Rede Celular

Victor Fragoso
Field Application Engineer – SIMCom



THE
DEVELOPER'S
CONFERENCE

Agenda

- O Mercado de IoT
- LPWAN
- NB-IoT vs CAT-M1
- SoftSIM

O Mercado de IoT



THE
DEVELOPER'S
CONFERENCE

➤ Já é uma realidade!



Smartphones



Connected cars



Industrial handhelds



Wearables



Vending machines



Parking meters



Sensors



Utility meters



Smart city



IoT gateways



Cameras



Asset trackers



Health monitors



Security systems



Security systems



Lighting / HVAC



Agriculture monitors

O Mercado de IoT



THE
DEVELOPER'S
CONFERENCE

Diário Oficial da União anuncia decreto com o Plano Nacional de Internet das Coisas

13 JUL 2019 | 19h04

[COMENTÁRIOS](#)

Foi publicado no Diário Oficial da União, em 25 de junho de 2019, o decreto presidencial que trata sobre o Plano Nacional de Internet das Coisas. O principal objetivo do plano é assegurar maior espaço à IoT no Brasil, o que permitirá o desenvolvimento de novas tecnologias quando o assunto é a livre concorrência e a livre circulação de dados, sempre levando em consideração a proteção aos dados pessoais.

BNDES aprova primeiro projeto-piloto de Internet das Coisas

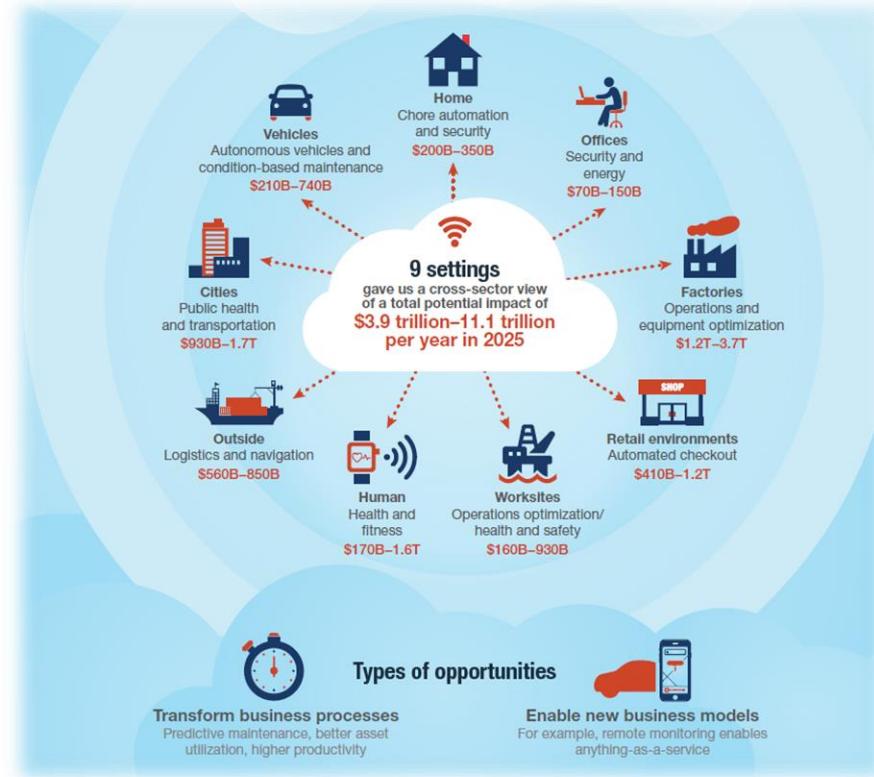
Iniciativa testará solução tecnológica aplicada ao tratamento de enfisema pulmonar

Monitoramento pode melhorar a vida de pacientes com doença responsável por 118 mil internações e 8,6 mil mortes ao ano

O Banco Nacional de Desenvolvimento Econômico e Social (BNDES) aprovou a primeira operação de apoio a projeto-piloto de Internet das Coisas (IoT) selecionado na chamada lançada em 2018: o teste de tecnologia inovadora de monitoramento de oxigênio ministrado em tratamento de pacientes com enfisema pulmonar proposto pelo centro de inovação CESAR. A solução poderá melhorar a saúde de milhares de pessoas, evitar o desperdício de oxigênio medicinal e diminuir custos com logística, barateando o tratamento.

Com investimento total de R\$ 2 milhões – sendo R\$ 1 milhão aportado pelo BNDES em recursos não-reembolsáveis – o projeto testará durante 16 meses um sistema de monitoramento da quantidade de oxigênio ministrada a pacientes com doença pulmonar desobstrutiva crônica, popularmente conhecida como enfisema pulmonar. O problema gera 118 mil internações, 8,6 mil óbitos e R\$ 104 milhões em despesas por ano, de acordo com o SUS. Trata-se da quarta causa de morte mais relevante no país, conforme dados do Ministério da Saúde.

O Mercado de IoT





THE
DEVELOPER'S
CONFERENCE

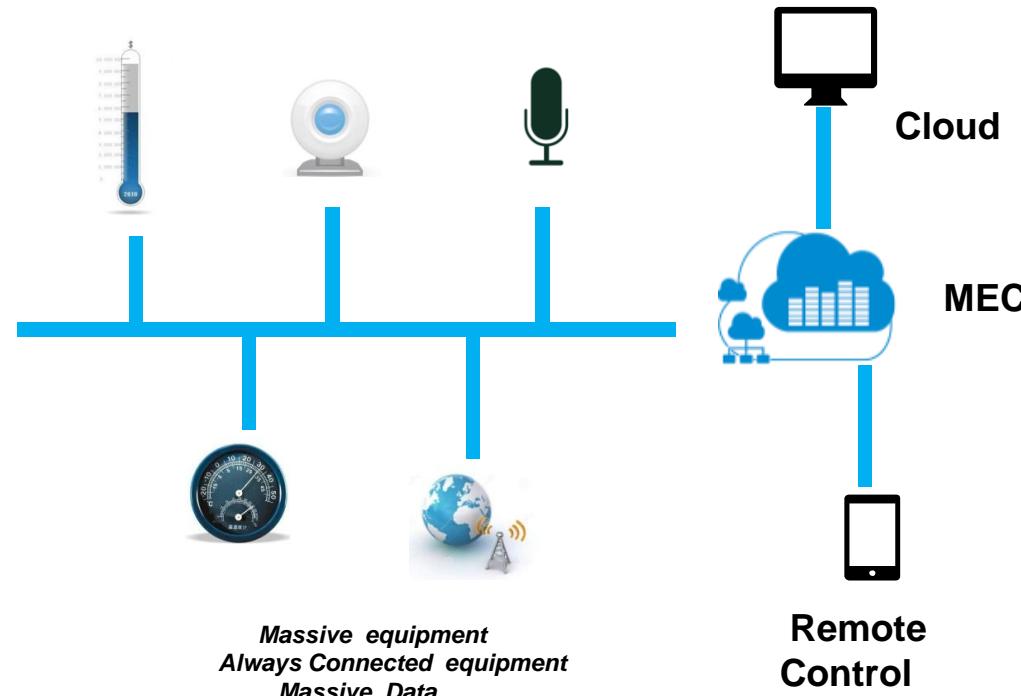
Alguem está interessado em
desenvolver projetos de IoT?



Conectividade!



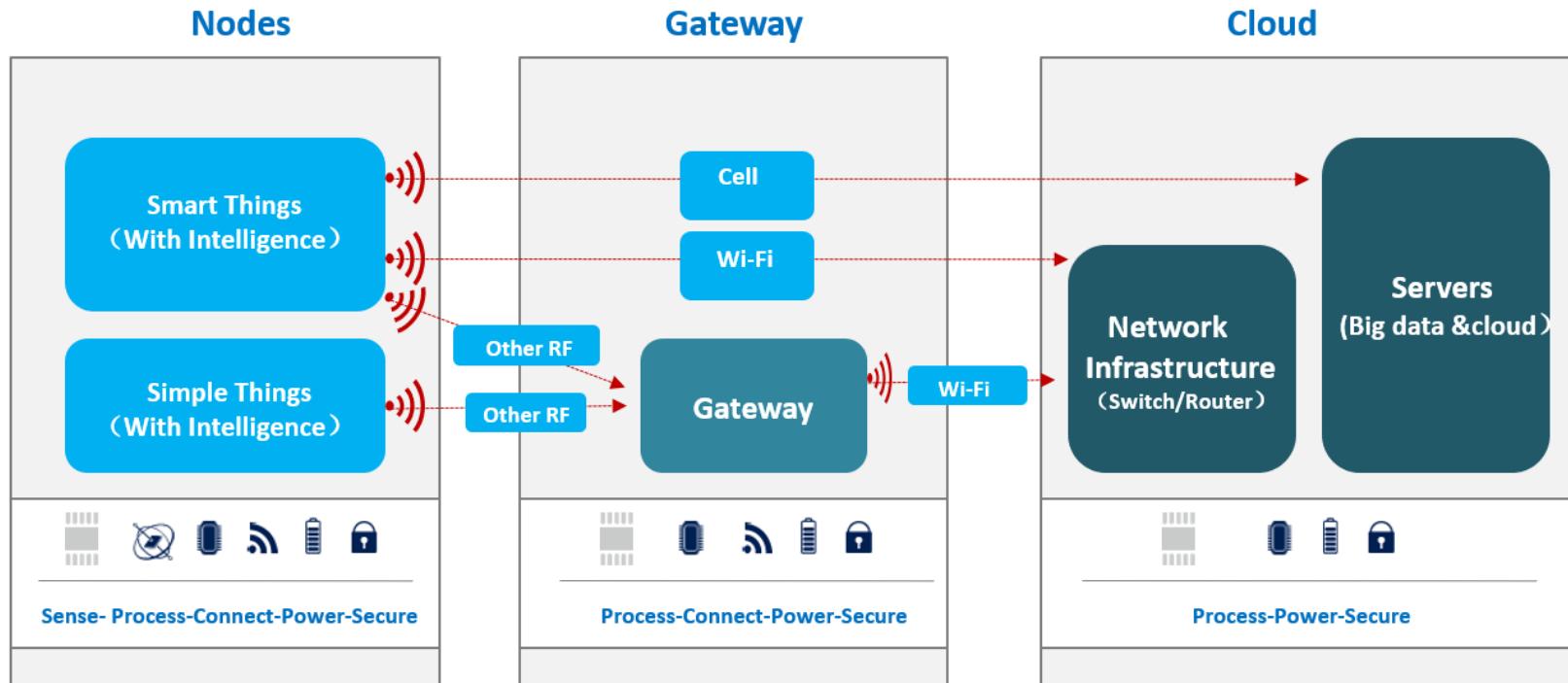
THE
DEVELOPER'S
CONFERENCE



Arquitetura de IoT



THE
DEVELOPER'S
CONFERENCE



Evolução da rede celular

Delivering faster and better mobile broadband experiences

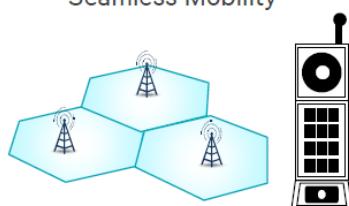


THE
DEVELOPER'S
CONFERENCE

Mobile 1G

AMPS, NMT, TACS

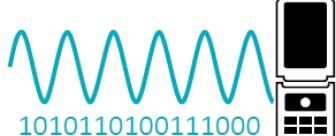
Foundation of Mobile
Seamless Mobility



Mobile 2G

D-AMPS, GSM/GPRS,
cdmaOne

Mobile for the Masses
More Voice Capacity



Mobile 3G

CDMA2000/EV-DO,
WCDMA/HSPA+, TD-SCDMA

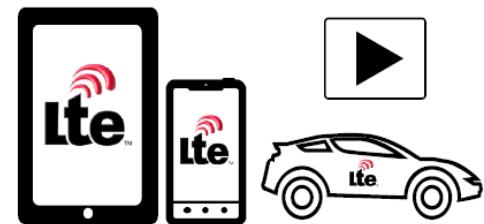
Mobile Broadband
Data Optimized



Mobile 4G LTE

LTE, LTE Advanced

Faster and Better Mobile Broadband
More Data Capacity



1980s

1990s

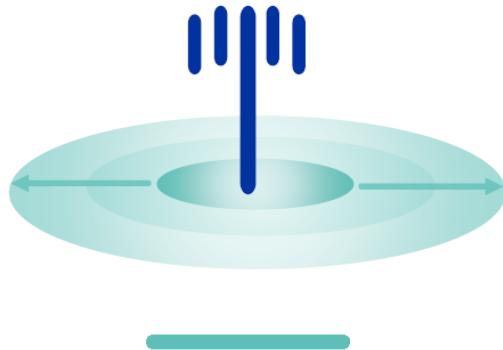
2000s

2010s

LPWAN



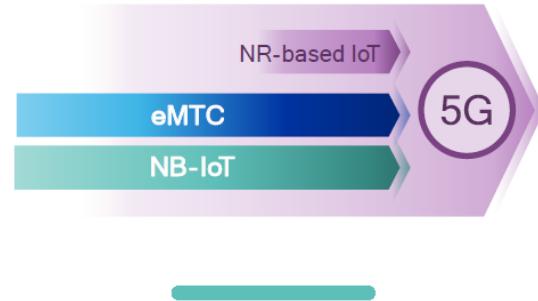
2G was designed primarily for voice communication and texting



Better coverage, battery-life & capacity¹



Features to support full range of services



4G LTE economies of scale & essential part of 5G platform

Especificações CAT



	LTE Cat-4 (Rel-8)	LTE Cat-1 (Rel-8)	eMTC Cat-M1 (Rel-13)	NB-IoT Cat-NB1 (Rel-13)
Peak data rate	Up to 150Mbps	Up to 10Mbps	Up to 1Mbps	<100kbps
Bandwidth	Up to 20Mhz	Up to 20Mhz	1.4Mhz	200kHz
Rx antenna	Dual Rx	Dual Rx	Single Rx	Single Rx
Duplex mode	Full duplex FDD/TDD	Full duplex FDD/TDD	Full or Half duplex FDD/TDD	Half duplex FDD
Mobility	Full mobility	Full mobility	Limited-to-full mobility	Cell reselection Only
Voice	VoLTE	VoLTE	VoLTE	No voice support
Transmit power	23dBm	23dBm	23, 20dBm	23,20 dBm

Escolhendo a tecnologia



THE
DEVELOPER'S
CONFERENCE

- Qual deve ser a velocidade?
- Qual deve ser o consumo de bateria?
- Qual deve ser a cobertura?
- Qual deve ser o custo do plano?

Velocidade



THE
DEVELOPER'S
CONFERENCE

Scaling up in performance and mobility

Scaling down in complexity and power



LTE Cat-1 and above

Delivering scalable performance and seamless mobility for high-performance IoT use cases

eMTC¹/Cat-M1

Optimizing for the broadest range of IoT applications with high-reliability and lower latencies

NB-IoT/Cat-NB1

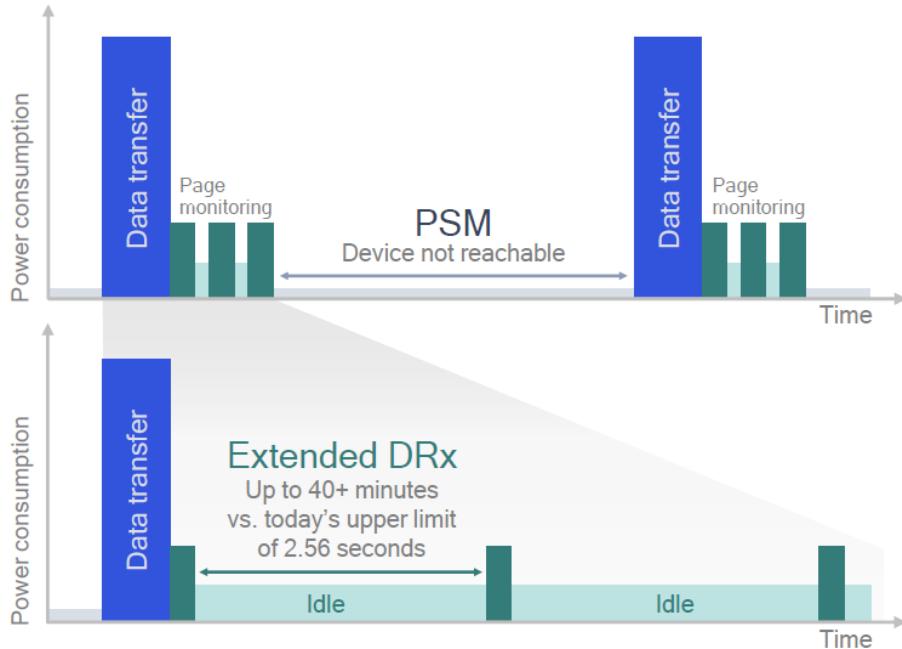
Providing extreme optimizations for low cost/power, low-throughput, delay-tolerant IoT use cases

LTE IoT: complementary narrowband technologies for low-power, wide-area use cases

Consumo de Bateria



THE
DEVELOPER'S
CONFERENCE



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



THE
DEVELOPER'S
CONFERENCE

Consumo de bateria

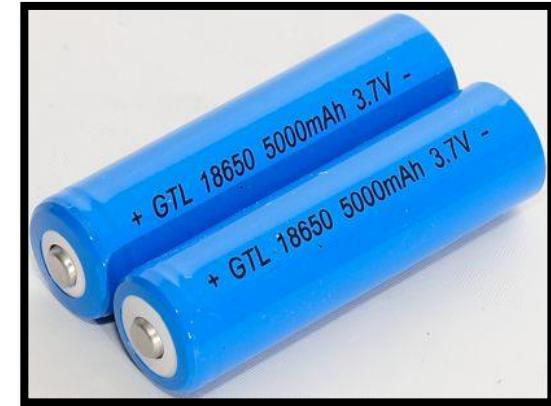
- PSM -> 9uA
- GPRS -> 345mA
- CAT-M1 -> 98mA
- NB-IOT -> 59 mA

Consumo de bateria



ACHIEVABLE NB-IOT BATTERY LIFETIME IN OPTIMIZED NETWORK CONFIGURATIONS

	Packet Interval	PSM Active	Optimized Peripheral
Comm. Netw. A	30 s	10.69 days	21.9 days
	5 m	12.81 days	222.65 days
	1 h	13.08 days	4.62 years
	1 d	13.10 days	10.89 years
Comm. Netw. B	30 s	6.00 days	7.3 days
	5 m	11.72 days	76.65 days
	1 h	12.97 days	2.12 years
	1 d	13.10 days	9.77 years
Priv. Netw.	30 s	9.97 days	18.25 days
	5 m	12.70 days	175.2 days
	1 h	13.07 days	4.01 years
	1 d	13.10 days	10.73 years



Cobertura



THE
DEVELOPER'S
CONFERENCE



LTE Cat-1 and above
Baseline 140.7 dB¹

eMTC and NB-IoT enhancements

- Repetitive transmissions
- TTI³ bundling

eMTC Cat-M1
 >155.7 dB

NB-IoT Cat-NB1
164 dB² or better



← Trading off spectral efficiency and latency →

Cobertura



THE
DEVELOPER'S
CONFERENCE

The screenshot shows a news article from mobiletime.com.br. The header features the mobiletime logo with a red heart icon and a blue ribbon-like shape. To the right is a menu icon (three horizontal lines). The main title of the article is "TIM realiza testes de longa distância de NB-IoT no interior de Goiás". Below the title is the author's name, "Bruno do Amaral, do Teletime | 18/03/19 18:28". The article text discusses TIM's partnership with Ericsson for NB-IoT tests in Goianésia, mentioning a 100-kilometer range and improved coverage limits. The text is in Portuguese.

TIM realiza testes de longa distância de NB-IoT no interior de Goiás

Bruno do Amaral, do Teletime | 18/03/19 18:28

Após a realização de testes em parceria com a fornecedora Ericsson, a TIM confirmou o funcionamento da sua NB-IoT em cima da rede comercial 4G da operadora em Goianésia, interior de Goiás. A empresa comunicou nesta segunda, 18, que executou experimentos de conectividade entre diferentes plataformas de Internet das Coisas em uma **distância de 100 quilômetros** e em diferentes direções da estação radiobase localizada em uma fazenda na região, a Jalles Machado, parceira do projeto "4G TIM no Campo".

Os testes utilizaram a tecnologia LPWAN em NB-IoT na faixa de 700 MHz (banda 28). Com o equipamento da Ericsson, a operadora diz ter **aumentado os limites da cobertura de 40 quilômetros para 100 quilômetros** sem impacto nos dispositivos.

Planos de NB-IOT



https://iot.t-mobile.com/pricing/

T-Mobile | INTERNET OF THINGS

NETWORK

SOLUTIONS

PRICING

PARTNERS

DEVELOPERS

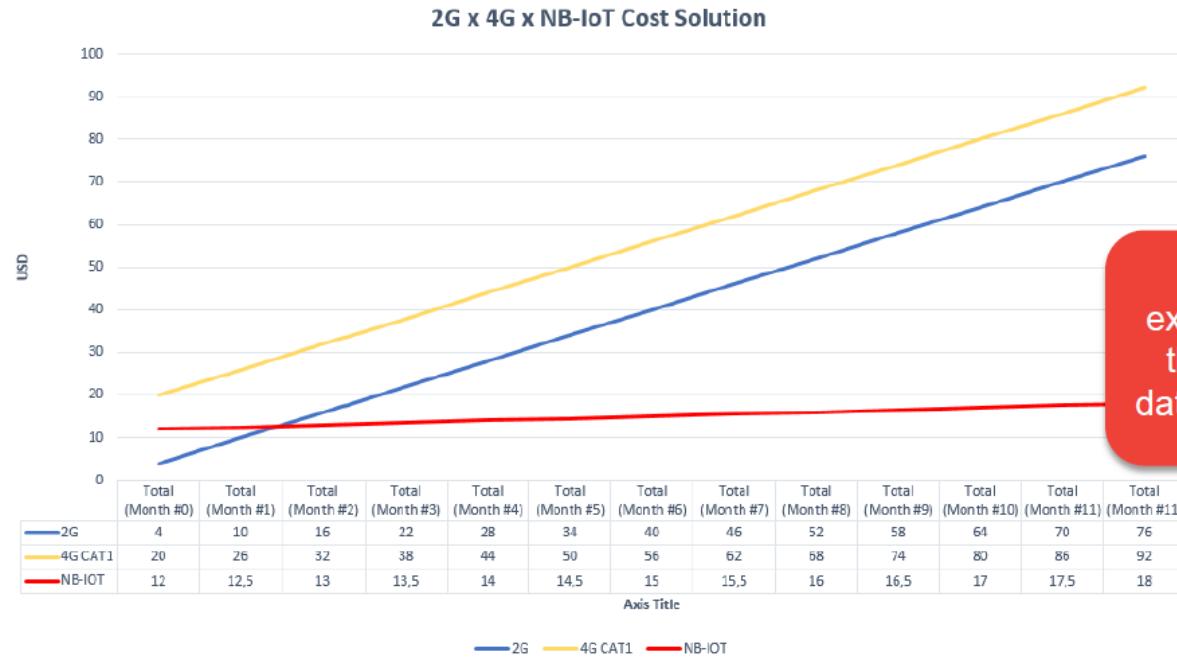


Get reliable, cost-effective connectivity for your new NB-IoT solutions.
This annual data plan delivers up to 12 MB or 12 months —with no overages.

Comparação de preço



THE
DEVELOPER'S
CONFERENCE



NB-IoT product may be more expensive when produced, **but** after the second month the price of the data plan compensates the total cost.

Data Plan Prices
Verizon **2G/4G** 1Mb/Month = 6 USD
T-Mobile **NB-IoT** 1Mb/Month = 0.5 USD



Preciso de um SIMCard para o produto?

SIMCards



THE
DEVELOPER'S
CONFERENCE



2FF - Mini SIM



3FF - Micro SIM



4FF - Nano SIM



MFF2 - M2M Form Factor (eSIM)

#include eSIM

SoftSIM



LINKS FIELD
Leading SoftSIM Provider

Junte-se a comunidade!



hackster.io/simcom



THE
DEVELOPER'S
CONFERENCE

The screenshot shows the hackster.io homepage with a search bar and navigation links for Projects, News, Contests, Events, Videos, and Workshops. A banner for 'SIMCom Wireless Solutions' is displayed, featuring the SIMCom logo and the tagline 'SIMCom - Modules for a connected world'. Below the banner, there are tabs for Home, Projects, Discussion, Products, Members, and Analytics. The 'Home' tab is selected. The main content area shows three recent projects: 'IOTA HOTSPOT - CLIENT MONITOR' (2.0 IOTA (mB), 77.0 MBITES, WINNER), 'IOTA Wi-Fi Hotspot for Urban Space' by Ronald Rodriguez Ruiz (8 likes, 421 views), and 'Connecting SIM7000G + TagoIO' by Victor Fragoso (6 likes, 232 views). To the right, there is a section for 'aws' with a SIM7000X-H module image and a 'aws' logo. A 'View all' link is also present.

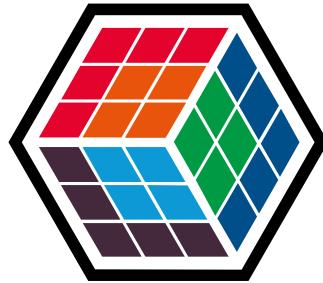
Victor Fragoso

Field Application Engineer
SIMCom Wireless Solutions

- hackster.io/victorffs
- linkedin.com/in/victorffs
- facebook.com/victorffs



The screenshot shows Victor Fragoso's profile on hackster.io. At the top, there is a search bar and navigation links for Projects, News, Contests, Events, Videos, and Workshops. Below that is his user card with a photo, name, project count (6), follower count (21), and following count (9). It also includes links to his LinkedIn profile and a dashboard. The main section is divided into Profile, Projects, and Activity tabs, with Profile being active. The Bio section contains his title as a Field Application Engineer at SIMCom Wireless Solutions. The Joined section shows he joined in November 2017 from São Bernardo do Campo, Brazil. The Skills section has an 'Add skills' button. The Projects section displays three recent projects: 'Connecting SIM7000G + TagoIO' (with a blue triangle graphic), 'Connecting SIM7600X-H to AWS Using MQTT and AT Commands' (with an AWS logo), and 'Conectando a Internet nas Coisas com LoRa #CPBR11 [PT-BR]' (with a 'THE THING NETWORK' logo). Each project card includes a thumbnail, title, author, and engagement metrics (likes, comments, shares).



THE DEVELOPER'S CONFERENCE