Brainstorming on IoT IMS: M2M IoT multimedia service signaling?

November 2017 (ITU Workshop SG 11)

Pr. Hakima Chaouchi

Telecom Sud Paris, France

Do you want to recieve a call from your fridge?

Hi, me again, your fridge, You Forgot to bring the eggs! Shall i order it directly ?

Yes, order the eggs at Auchan this time, not Carefour!

Telecom Sud Paris?

- French Prestigious Engeneering School
- Member of Mines & Telecom Institute
- Main Location in Evry: Paris Suburb
- Second Location: NANOINOV in SACLAY, Paris Suburb
- More than 100 permanent reserachers as Associate Professors, Professors
- CNRS Laboratory SAMOVAR, UMR 5751
- Innovation and Startup support
- Active research: Telecommunication, Networking, Network services and applications, Physical Layer design, Modeling & Performance Analysis


SACLAY


EVRY

Hakima Chaouchi?

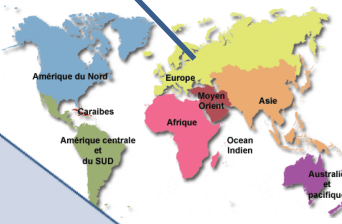
IMT

IMT/EIT Digital

King's College

UPMC

Satelite InternetIndustry



1996

2000

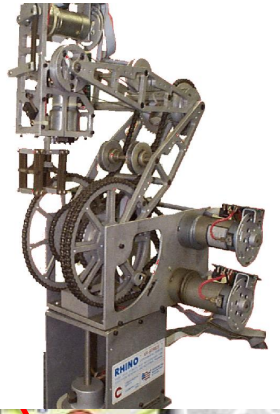
2001

2006

2015

- Full Professor, researcher and innovator at Telecom Sud Paris, IMT
- Research group: Emerging networks and services, special focus on IoT
- ICT Open innovation and entrepreneurship business coach
- EIT ICT Labs DTC Manager
- ITU FG DPM member
- AIOTI Member

Technology roadmap: The Internet



Technology Reach

Cost reduction leading to diffusion into 2nd wave of applications

Demand for expedited logistics

RFID tags for facilitating routing, inventorying, and loss prevention

Supply-Chain Helpers

Source: SRI Consulting Business Intelligence

2000

2010

2020

Time

Is Voice based IoT a reality?

- Voice commands of IoT devices
- Talking objects?
- Text to speech?

Is IoT traffic tends to become multimedia? Not only text?

Ericsson, AT&T and Qualcomm demonstrate VoLTE call for Internet of Things

February 28, 2017 02:00 ET | Source: Telefonaktiebolaget LM Ericsson

- Successful demonstration of Voice over LTE (VoLTE) on Cat-M1/LTE-M technology using Qualcomm Technologies' MDM9206 LTE modem and Ericsson's radio and core network
- The new technology enables regular voice services for Internet of Things (IoT) applications on Cat-M1/LTE-M -enabled IoT devices
- AT&T plans to extend the technology into its mobile network to enhance existing and new IoT use cases requiring voice services

Press Release_Ericsson, AT&T, Qualcomm_VoLTE for IoT.pdf

Ericsson (NASDAQ: ERIC), AT&T and Qualcomm Technologies, Inc., are the first to announce the performance of a successful Voice over LTE (VoLTE) call for Internet of Things (IoT) on existing mobile network infrastructure with new software activation and new modem device that supports CAT-M1/LTE-M technology.

The demonstration used Qualcomm Technologies' MDM9206 LTE modem, designed to support Cat-M1/ LTE-M, as well as Ericsson LTE Radio Access Network, Ericsson IP Multimedia Subsystem (IMS), Ericsson Evolved Packet Core (EPC) and Ericsson User Data Management network infrastructure and new software. The demonstration shows that the technology is mature and ready for commercial deployment in operator networks.

"AT&T is proud to participate alongside Ericsson and Qualcomm Technologies to advance VoLTE support over Cat-M1/LTE-M," says Chris Penrose, President, IoT Solutions, AT&T. "The ability to support voice services is an important feature to many verticals within our IoT portfolio, including our customers in the alarm and security industry, automotive, wearables and connected health markets."

Extending mobile voice service capabilities to IoT devices opens up opportunities to expand enterprise services to areas such as security alarm panels, remote first aid kits, wearables, digital locks, disposable security garments, and other types of IoT-enabled applications and services.

This means that IoT devices using VoLTE on Cat-M1/LTE-M will allow enterprises to make voice calls, extending the capabilities of operators' mobile networks by tapping into the extensive and innovative IoT device ecosystem.

Problem?

- Do We need multimedia session management in Internet of Things?
  - No : if only IoT monitoring applications
  - **YES**: If interactive IoT applations: For instance those with Voice command IoT control applications
    - SIP is the IMS signaling protocol for IP multimedia session management
    - But SIP is too heavy and IoT devices are constrained

3GPP TR 23.720 V13.0.0 (2016-03)

Technical Report

Saut de section (page suivante)

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Study on architecture enhancements for
Cellular Internet of Things
(Release 13)

A GLOB

3GPP TR 23.730 V14.0.0 (2016-12)

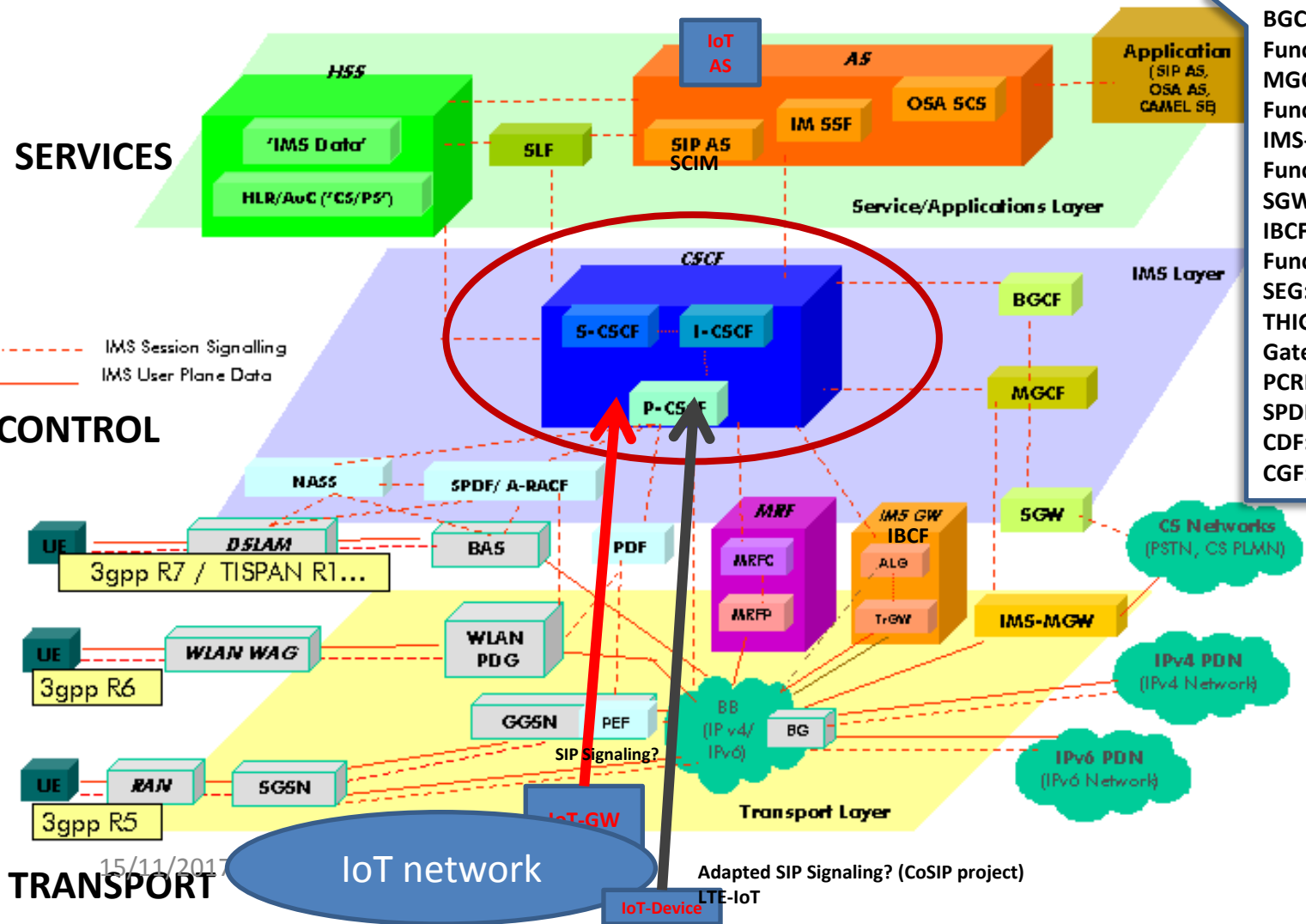
Technical Report

Saut de section (page suivante)

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Study on extended architecture support for
Cellular Internet of Things (CIoT)
(Release 14)

Architecture IMS

CSCF: Call Session Control Function
HSS: Home Subscriber Server
SLF: Subscription Locator Function
AS: Application Server
MRFC: Media Ressource Function Controller
MRFP: Media Resource Function Processor
SCIM: Service Capability Interaction Manager
BGCF: Breakout Gateway Control Function
MGCF: Media Gateway Control Function
IMS-MGW: IMS Media Gateway Function
SGW: Signaling Gateway
IBCF: Interconnection Border Control Function IWF: InterWorking Function
SEG: Security Gateway
THIG: Topology Hiding Inter-network Gateway
PCRF: Policy Control Rule Function
SPDF: Serving Policy Decision Functio
CDF: Charging Data Function
CGF: Charging Gateway Function



3 orientations

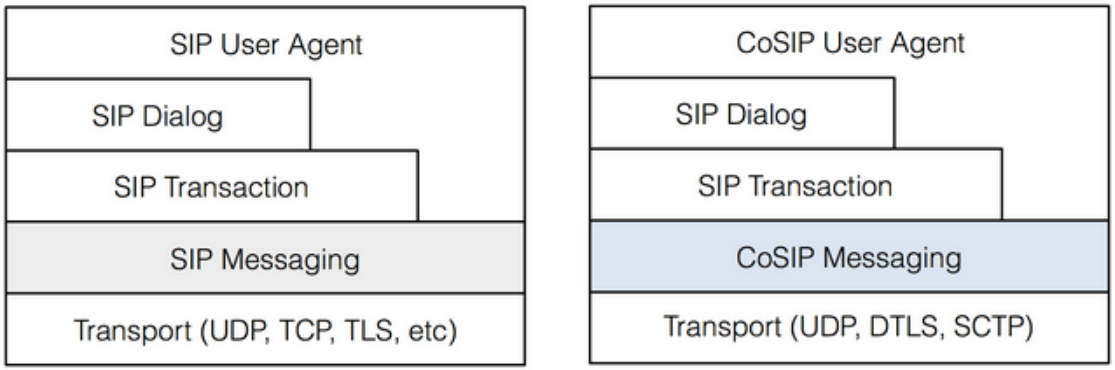
- Service level: IoT AS (usecase based), AAA and charging model. **(API)**
  - Demo With OpenIMS
- IoT GW level: SIP signaling adaptation (**future 5G?): : example Text to speech signaling**
- IoT Device level: LTE level **(future 5G ?)**, adapted SIP (in case of IP IoT device/6lowpan…etc): example talking object

Related work: Real time Publish and Subscribe signaling: CoSIP

CoSIP

A Session Initiation Protocol for the Internet of Things

The Internet of Things (IoT) refers to the interconnection of billions of constrained devices, denoted as "smart objects", in an Internet-like structure. Smart objects typically feature limited capabilities in terms of computation and memory and operate in constrained environments, such as low-power lossy networks. As the Internet Protocol (IP) has been foreseen as the standard for communications in IoT, an effort to bring IP connectivity to smart objects and define suitable communication protocols (i.e. Constrained Application Protocol (CoAP)) is being carried out within standardization organizations, such as the Internet Engineering Task Force (IETF). In this project, we propose a constrained version of the Session Initiation Protocol (SIP), named "CoSIP", whose intent is to allow constrained devices to instantiate communication sessions in a lightweight and standard fashion. Session instantiation can include a negotiation phase of some parameters which will be used for all subsequent communication. CoSIP can be adopted in several application scenarios, such as service discovery and publish/subscribe applications, which are detailed. An evaluation of the proposed protocol is also presented, based on a Java implementation of CoSIP, to show the benefits that its adoption can bring about, in terms of compression rate with the existing SIP protocol and message overhead compared with the use of CoAP.



a) SIP layered architecture

b) CoSIP layered architecture

The project is based on the experience and development approach of the MjSIP Project and is currently available for Java and Android platforms.

CoSIP is an OpenSource project and will be shortly released to the community through archives with source codes and example applications and through GIT or SVN repositories.

A SIP/IMS Platform for Internet of Things in WLAN-3GPP Integration Networks

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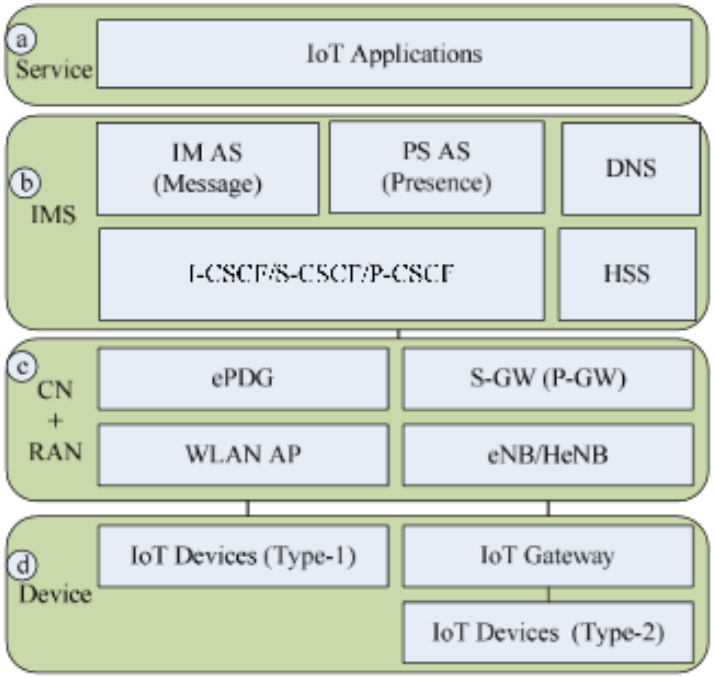

Fig. 1. The proposed SIP/IMS Platform for IoT

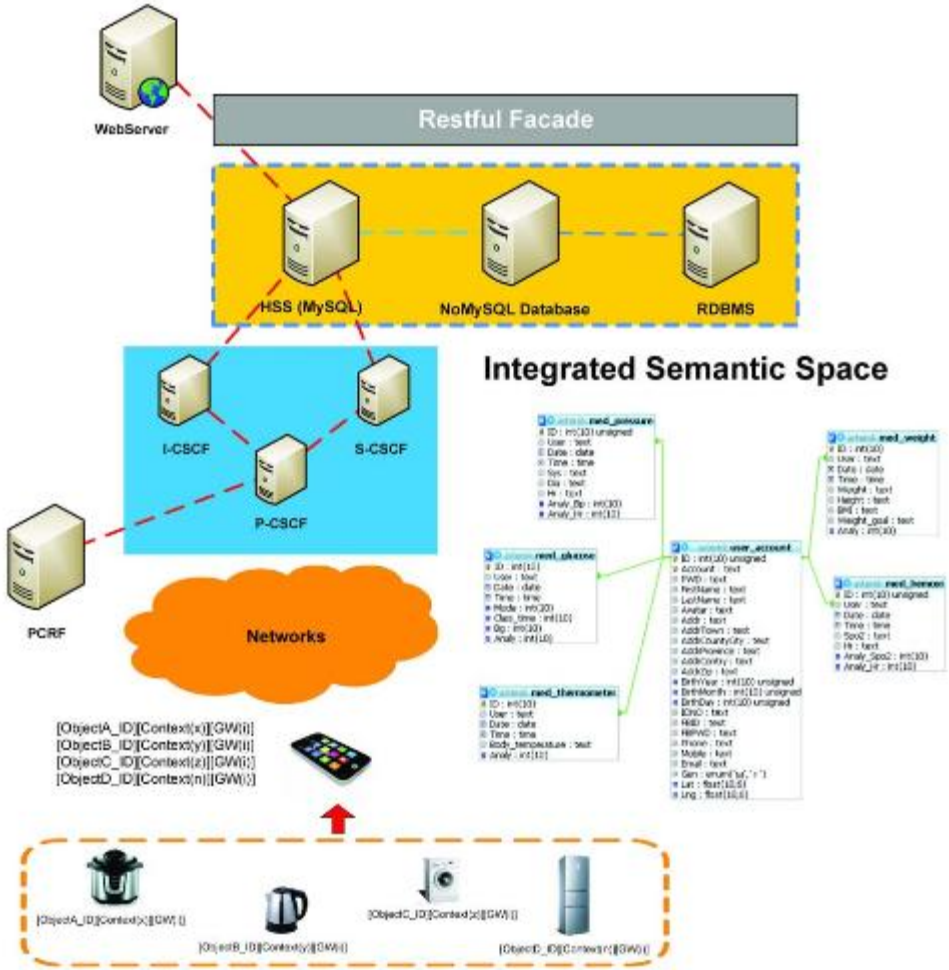

Fig. 2. IoT-IMS Operation

Demonstration of OpenMTC – M2M Solutions for Smart Cities and the Internet of Things

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***Abstract*—This extended abstract covers the setup of our demonstration, giving a practical view on our research and development activities in the field of Machine-to-Machine (M2M) communication or machine type communication (MTC). M2M communication is a paradigm in which end-to-end communication is executed without human intervention connecting non-IT objects to an IT infrastructure. Our demo aims at enabling the audience to use different client devices (e.g. smart phone, tablet PC, notebook) to access our M2M applications and control sensors, actuators, and devices (e.g. lamp, fan). Also, the visitor can feed the M2M system with policies to trigger automated sequences of actions and thereby steer and control the M2M communication that is performed without human intervention.**

MACHINE	-- TO --	MACHINE
Communication terminal independent of human interaction ▪ Acting automatically or on remote request ▪ Managed remotely ▪ Mobile and fixed terminals ▪ Monitoring device (sensor) ▪ Actuator device (e.g. switch) ▪ Associated order of magnitude: trillion = 10^{12}	**Network facilitating the M2M communication** ▪ Access & core network, backhaul, app. server ▪ Enabling connectivity (AAA & security, session management, QoS, charging, mobility) ▪ Supporting data traffic of terminals ▪ Supporting the signaling of terminals	**Terminal automating the services** ▪ Sensor data aggregation, processing and presentation ▪ Data caching and interpretation ▪ Real-time communication ▪ Automatic decisions and control ▪ Policies, instructions and notifications

Fig. 1. M2M

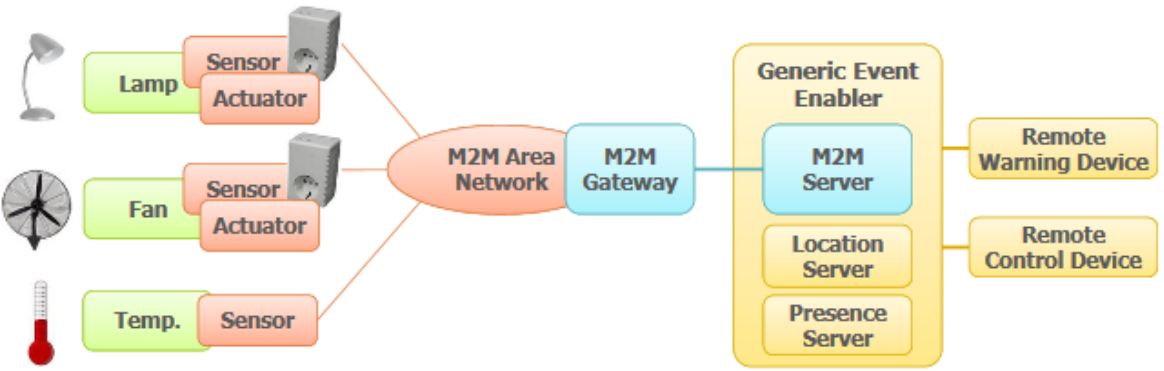


Fig. 3. Abstract demo setup

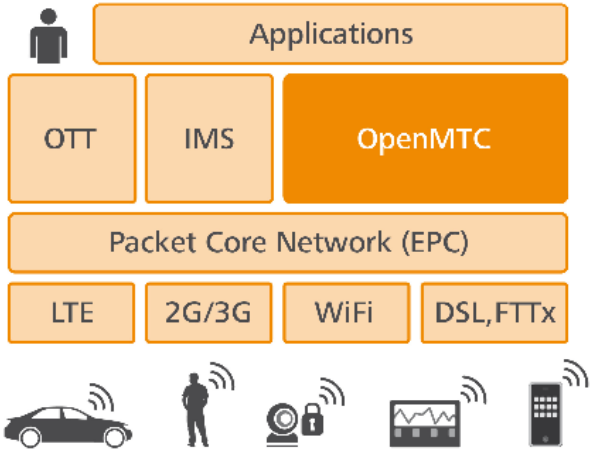
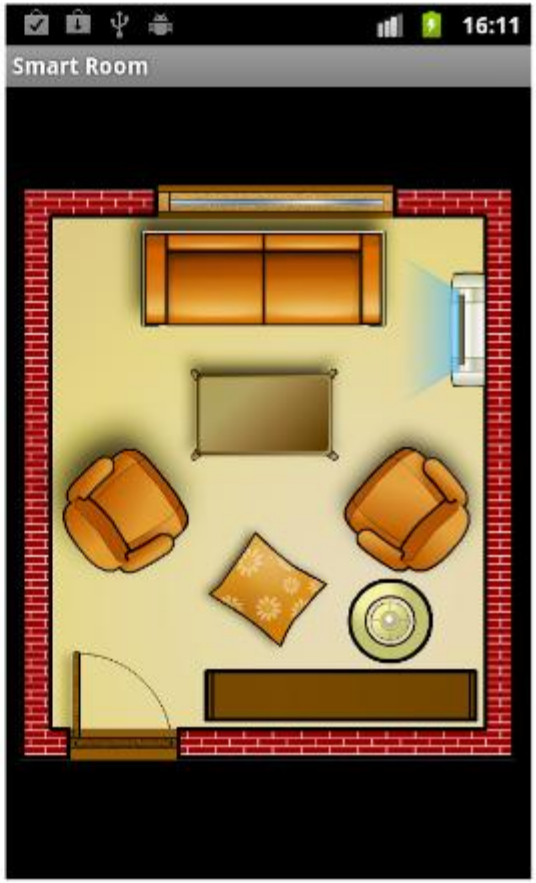


Fig. 2. The OpenMTC framework


monster - 2.9.25-SNAPSHOT
File Contacts Actions Tools Help Location
Alice
personalize profile
Write a message here for your friends to see
Node Information
Subscribe to sensor data
Available Nodes:
Software Router
Multisensor
Lamp 2
Lamp 1
Select Attributes:
Work
kWh
Frequency
Hz
IRMS
mA
VRMS
V
Load
Bigger
10
W
Power
Location Selection:
Address:
Anna-Louisa-Karsch-Str. 2, I
Radius:
300
Filter Event:
Exit
Select Default Action
Subscribe
Contacts
call
Messages
Sensor


16:11
Smart Room

How API do you want to be?

By Ismo Matilainen on Fri 8 April 2016

Twitter: @nokianetworks

Many operators are asking how they can make money from their VoL investments. Will Application Programming Interfaces (APIs) provide t answer?

Currently the main use of APIs by operators is with the Internet of Th (IoT). But APIs can open up many more opportunities for operators.

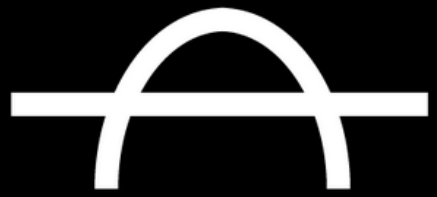
So, what are the use cases that could be implemented? Well, Nokia recently demonstrated a commercially available solution and showed how it could create new revenue opportunities and business models f operators. By exposing their IP Multimedia Subsystem (IMS) to developers through APIs, operators can create new business with new services deployed on top of their Nokia VoLTE/VoWiFi core.

Such a communication API allows operators to combine their capabili with other services by opening up the network to third parties, who t

Ponte Install Architecture API Source

ponte

Connecting Things to Developers



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Protocols

Ponte allows you to publish and receive the data using any protocol: HTTP, MQTT and CoAP. You can mix and match: submit with CoAP and subscribe via MQTT. Thanks to MQTT subscribes and CoAP observe, your devices can get updated in real-time. Thanks to MQTT-over-Websockets,

Data Formats

Ponte aims to convert multiple data formats, you will be able to publish your data in JSON, MsgPack, Byson, BSON and XML. Need another one? Use HTTP accept queries to get another version.

Security and Privacy

Ponte will help you, the developer, in building a user-driven security solution to support the communication between all these devices. Thanks to Ponte, there will be no need to prepare a custom authentication for your things, and another for your users.

Home

Autonomous Control for a Reliable Internet of Services (ACROSS)

Currently, we are witnessing a paradigm shift from the traditional information-oriented Internet into an Internet of Services (IoS). This transition opens up virtually unbounded possibilities for creating and deploying new services. Eventually, the ICT landscape will migrate into a global system where new services are essentially large-scale service chains, combining and integrating the functionality of (possibly huge) numbers of other services offered by third parties, including cloud services. At the same time, as our modern society is becoming more and more dependent on ICT, these developments raise the need for effective means to ensure quality and reliability of the services running in such a complex environment. Motivated by this, the aim of this Action is to create a European network of experts, from both academia and industry, aiming at the development of autonomous control methods and algorithms for a reliable and quality-aware IoS. Keywords: Service oriented internet, cloud services, autonomous control, reliability, pricing.