HARVESTING IOT DATA
(USING IP NETWORKS)

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OVERVIEW

THE NETWORK SOCIETY

AGGREGATION AND CONVERGENCE

IP BASED IOT AND M2M NETWORKS

USECASES AND PROTOTYPE
THE NETWORKED SOCIETY...
A VIEW OF TRANSITION

Today’s IoT Excitement

IoT/M2M verticals, Alliances
Proprietary Solutions
A technology per Application
Cloud App & Vendor kit

Mature and Interoperable

IP based Cloud Connectivity
Secure and Standardized, IP (v6)
Leverage Web and Open API
Wireless and Cellular IoT Convergence

Benefits
- Cost efficient devices
- Large developer community
- New roles in the value network

Cloud APPs
L3 and L2 transport
IPv6 is key
AGGREGATION AND A SERVICE POINT CLOSE TO THE IOT EDGE

IoT/M2M Applications | Orchestration Function
---|---
Service Controller | OSS & BSS | Policy Enforcer | SDN Controller

Operator’s Core Network

Backhaul and Transport network

IoT Service Launch point

AGGR GW

GW and Services

Transport Network

IPv4, IPv6

IP(v6) & Non-IP

IoT/M2M

No Change in Existing network Integrated for IoT data handling

IPv4, IPv6

AGGR GW

IoT/M2M

IoT/M2M

M2M/IOT

IoT/M2M

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AGGREGATION AND CONVERGENCE
M2M devices are starting to deploy but…
- SIM devices are costly
- ZigBee, BlueTooth, Wifi will exist.
- Industrial Applications needs high rate, QoS

How to apply intelligent transport of these data?
- MARS: Aggregates data from
  - Non-SIM IoT devices
  - Anchor point for secure infrastructure services
WHAT IS MARS?

› Concept of M2M Aggregation and Routing Services

› Aggregates/Transports
  - IOT Data for Number of IoT networks
  - Data rate from some IoT networks are 1-10mB/s
  - Aggregates data per customer/tenant
  - May co-locate with Service-GW

› Provisions
  - Centralized Network Manager
  - Software Defined Control
  - Open SDN API – OpenFlow enabled
  - Enables IPv6 6lowPAN services in IoT networks
  - Enables other Ericsson specific Device Management provisioning
  - Anchor point for infrastructure security
DEVICES AND IP(V6) ADDRESSES

› IPv6 Address can cover the number of devices\(^{2^{128}}\)
› Auto-configuration and Neighbor Discovery
› Ability to connect with dual stack Applications
› IPv6 for IOT/M2M devices
  – 6Lo and 6LoWPAN [RFC4944, RFC6282, RFC6775]
  – IPv6 optimizations for 3GPP and Wireless Networks

Goal:

› Seamless Connectivity to Cloud and M2M Applications
› Using existing Infrastructure and Network Management
6Lo AND 6LowPAN

› 6Lo is a new WG at IETF
› IPv6 over Constrained Node Networks
› Based on **6LoWPAN stack** (RFC 4944, RFC6775, RFC 6282)
› Supports IPv6 over multiple low-power Link-layer technologies
  - Zwave, BT-LE, DECT-LE, ZigBee IP, IEEE 802.15.4 etc.
› Charter: [https://datatracker.ietf.org/wg/6lo/charter/](https://datatracker.ietf.org/wg/6lo/charter/)
› Enables
  - End-to-End data flows with IOT devices
  - Global Reachability through IPv6 addresses
  - Internet Connectivity via a IPv6/6LoWPAN Gateway
  - Saving energy while using IPv6
  - Compressed IPv6 header for low MTU network

› **6LoWPAN** : when L2 is IEEE 802.15.4

› **6TisCH**: 6LoWPAN + Software to support time synchronized channel (IEEE 802.15.4e)
› ZigBee IP, IPSO, ITU-T, Threads, NIST: 6LowPAN as the constrained node IPv6 stack
IoT Protocol Architecture

Industry Specific Applications

Orchestration and Service level Applications

SDN and Data management for M2M/IoT

M2M Connectivity Applications

IP Networks

Cellular or Wireless Devices L2 Networks

OneM2M, LWM2M Service SDK

REST API, Open API, WEB Sock

SDN-Controller, DM, SEP, CM

Routing, HTTP/COAP, MQTT, DTLS

TCP UDP ICMP

OF/Legacy Forwarding

GTP, L3VPN, L2VPN, IPSec

IP IPv6 6LoWPAN

IEEE 802.15.4, Wifi, BT-LE, NFC, DECT-ULE, LTE, 5G
Convergence

› The IOT Aggregation and Service Point function [Transport layer]
› Enabling easy provisioning and new services
› Control point close to the IoT networks for fast response
  – Local data analysis possible when needed

› COST EFFECTIVE
  – Can be part of an existing platform at the Edge
  – Can run on a FIXED network with simulated GTP
  – Can be a new entity dedicated for M2M/IOT service over Broadband Transport [isolation of high bandwidth/speed data path]
  – Use existing IP infrastructure
USE CASES
THE SERVICE PROVIDER ANGLE

- SP offering services for VNO
- MARS aggregates 1000s of nodes
- No change in existing infrastructure
- Aggregation service per VNO?
- SP to offer services for subscribers
MARS BACKHAULING IOT DATA TO OPERATOR'S NETWORKS

Meshed aggregation

MARS as Aggregation Node at Access

MARS as Aggregation Node at Access

MARS as Aggregation Node at Access

IoT/M2M

GTP To Mobile Core

Backhaul to Fixed Core
Prototype
ERTICSSON IP-ON-IOT PROTOTYPE

Prototype
A Proof Of Concept of Technology
(In progress)

Connects to Cloud and Data Centers
Service based Aggregation
Multi-destination Forwarding Multi-protocol Support

APPs
IOT/M2M
A B Cloud

Orchestration
SDN-C
SGW
Priority Path(A)
Regular Path(B)

Intelligent IOT/M2M Service Platform

6lo GW
6lo
6lo
6lo

A Proof Of Concept of Technology (In progress)
Connects to Cloud and Data Centers
Service based Aggregation
Multi-destination Forwarding Multi-protocol Support
SUMMARY

› Businesses to offer IoT Services

› IoT/M2M are fabric of Network Society

› Data aggregation at Access Needed

› IP and Cloud to converge SIM based M2M and IoT data

› MARS to enable IoT Convergence
WHAT IS 6LOWPAN

› **6LowPAN** = IPv6 over Low-Power wireless Area Networks (e.g., IEEE 802.15.4 MAC)

› **6LowPAN(6lo)** stack enables:
  - End-to-end data flows
  - Network Maintainability
  - Global Reachability with IPv6 addresses

› **6LowPAN(6lo)** stack allows:
  - Stateless and efficient header compression
  - Standard socket API, CoAP, MQTT
  - Minimal use of code and memory
  - Direct Transparent Internet Integration