InovCity Aparecida
Developing a smart grid project in EDP Brazil.
EDP no Brasil e EDP Bandeirante

- 28 Cities
- 1.5 million of consumer unities
- 4.6 million of clientes
- 63 Subestations
- 14.7 TWh of Distributed Energy
- 3,500 MVA of installed power

EDP AP - PA
Power: 373.5 MW

EDP MS
Power: 68.8 MW

EDP Escelsa
Clients: 1.3 MM
Distributed Energy: 10 TWh

EDP Renewable
Power: 70 MW

EDP Renewable
Power: 13.8 MW

Generation - CE
Power: 720 MW

Generation - TO
Power: 1.355 MW

Generation - ES
Power: 309.1 MW

Generation - MS
Power: 68.8 MW

Generation - AP - PA
Power: 373.5 MW
Ecil Energia

Ecil Energia is a Brazilian company, with Ecil Group’s tradition and strength, founded in 1929.

Ecil Energy works in the areas of Automation, Control and Protection of Distribution Substations and Power Transmission.

EDP = Brazilian’s Pilot Project: Aparecida City

Tourism town with 1% of the energy users of EDP Bandeirante

35,000 inhabitants;
15,300 power customers;
121 km²;
Tropical weather;
High HDI Level (0.804);
R$9,988/person GDP.

R&D Project:
Smart Meters;
Public Lightning;
Distributed Generation;
EV Support.

Investment: U$ 4 Million
First Stage: 6 Different Areas

- **Efficient Public Lighting**
  - LED.

- **Energy Efficiency**
  - More efficient lamps, refrigerators, and showers donated to low income consumers.

- **Distributed Generation**
  - Solar PV panels performance test.

- **EV Support**
  - Electric vehicles.

- **Smart Metering**
  - Smart Meters: 100% LV units

- **Community Awareness**
  - Educational programs within local institutions.
Aparecida Project (InovCity)

**METERS LV**
**TOTAL: 13,800**

- **Single Phase:** 1,500
- **Two Phase:** 10,900
- **Three Phase:** 1,400

- **A1:** 01
- **A4:** 34
- **MT:** 6
- **CME:** 11
- **ETs:** 460

**ZIGBEE Coordinator**
200 units

**SW – Management**

1. Grid Management;
2. Loss Management;
3. Process Flags;
4. Metering Portal;
5. CCS Integration;
6. Tariff Management.
Meter and Coordinator: 100% Brazilian Technology

R&D: EDP Regulatory Budget and Ecil Energia Technical Development.
ZIGBEE Gateway

- Up to 8 Zigbee networks;
- 8 directional antennas;
- GPRS/GSM/ 3G compatible;
- Ethernet, Bluetooth, Wi-Fi and WiMAX;
- Backup Battery;
- IP66 – External Use Installation.
Advantages of zigbee

- Wireless communication with expected range of up to 500 meters;
- Operating Frequencies between 868 MHz and 2.4 GHz;
- Transmission rate around 250Kbps;
- Low power consumption;
- Low implementation costs;
- Variable Network topology;
- Interoperable
Disadvantages of GPRS

**Speed**
Due to the low number of GPRS Base Stations, specially in Aparecida, typical connection speeds are below 56K, when full connections are available.

**No Quality of Service**
The public GPRS networks in Aparecida grant voice connections priority over data connections yielding a high number of disconnections for the data applications.

**Reliability**
Service availability is below 95% due to poor implemented infrastructure.

**Service Costs**
Available GPRS connections are billed based on data volume transferred, with high prices per contracted maximum bytes transferred in a month. Services costs for the data volumes needed are prohibitive.
Architecture
Software responsible for the telemetry system, managing the complete network and meter status in InovCity, in addition to the connection to the various EDP entreprise systems.
R&D: EDP Regulatory Budget and Ecil Energia Technical Development.

- **P&D BD-ES-004-10**
  - METER BILLING + POWER QUALITY

- **P&D BD-ES-003-10**
  - HOME CONTROL
Internal Topology - Home

- Smart Plug
- Home Display
- ZIGBEE Coordinator
- Single - Phase, Two - Phase and Three - Phase
Thank You!!

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