About me

- Masters in Electrical Engineering from Eindhoven University of Technology (2011).
- Independent Networks and Wireless Communications Professional.
- Over 14 years of research and industry experience – Microsoft, Liberty Global, Qorvo, Philips and IMEC.
- IEEE member since 2019, Vancouver Section.
- COMSOC member.
- Dedicated to leveraging digital technology for green energy initiatives.
Electrical Grid as a Digital Platform

- **Grid Reliability**
  - Monitoring vital stats voltage, current, frequency, phase

- **Grid planning, maintenance and Efficiency**
  - Data helps in load profiling, demand forecasting and developing load management strategies

- **Decarbonization**
  - Demand side management

- **Enable microgrids and peer to peer energy trading**
  - Integration of energy storage

- **Security and resilience**
  - Respond to events like short circuits and faults in the grid.

- **Electricity Directive- 2019/944**
  - EU mandates real time monitoring and distribution of data to consumers and producers
The Connected Grid Architecture
Communication technologies for Smart Grids

**Fixed Access**
- DSOs piggyback on a MSO’s broadband infrastructure
  - Cable – Based on DOCSIS 3.0/3.1/4.0 standard.
  - Fiber optics – ITU’s PON standard enabling FTTM.

**Wireless**
- DSO build their own IOT network or use a MNO’s existing infrastructure
  - LoRaWAN - Based on proprietarary LoRa silicon
  - Wi-Fi Halow - Based on IEEE’s 802.11ah standard
  - NB-IOT – Based on LTE standard

**Wired**
- Data is sent on existing power lines
  - ITU’s G.Hn based Power line communication (PLC)

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**Range**

**Goodput**

**Security**

**Reliability**

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DSO: Distribution System Operator
MSO: Multi System Operator
MNO: Mobile Network Operator
Low Voltage Sensor Architecture

- Power factor is calculated by measuring the phase difference between the voltage (V) and current (I) measurement.
- The Neural Processing Unit (NPU) can identify load patterns or signatures and make realtime decisions to reduce outages.

Reference:
Deployment Considerations

Network and Cloud Security
On premise vs public cloud
PKI infrastructure,
Authentication,
Authorization and Accounting (AAA)

Networking
IPV6 IOT networks
over IPV4 backbone

Network maintenance
Firmware upgrades
Remote access

Network ownership and availability
SLA with MSO and MNO
Partner with OEM/ODMs

Integration and Deployment
Integrating sensors in the grid.
Managing the cloud database.

Machine learning and AI
At the edge vs Cloud
Let's us build a secure, connected Grid.

Any Questions?

or

Send in your comments/Q's to:

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Thank you for the opportunity and listening to my presentation!