

Cyan Technology Ltd

Meeting the challenges of smart metering in emerging regions

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www.cir-strategy.com/events/cleanpower

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Smart Metering



- Complete scalable solution for smart metering
- Wireless mesh and point-to-point meter reading in license free bands
- Best in class range and system robustness
- Electricity metering plus battery powered gas and water metering

Smart Lighting

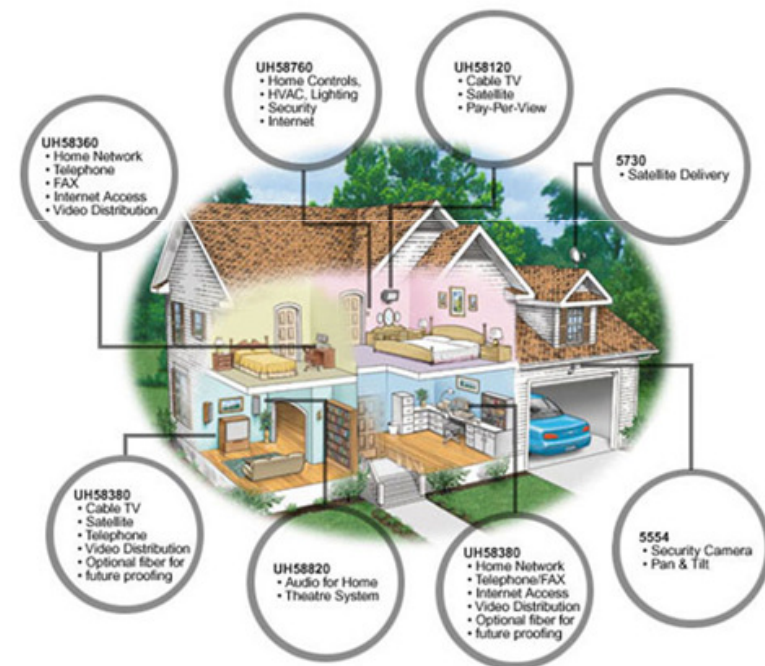


- Smart lighting solution for energy efficient lighting control and measurement
- Street lights, tunnels, car parks and public locations
- Controls all types of lamps including sodium, LED and Xenon (HID)
- Lamp dimming, bulb failure etc.

Cyan's delivers integrated smart metering for emerging markets, and has achieved substantial traction in India (pilots and trials)

- Focusing on the issues faced by the Indian utilities
- Working with established partners in the region
- Developing technology specifically for the region
 - **Interoperability:** through simple UART interface
 - **Risk reduction:** by deploying AMR with upgrade to AMI
 - **Sub 1GHz radio mesh:** 60-100m range in dense urban environment

- Integrated control of heating, ventilation and cooling
- Lighting and appliance control
- Micro generation (e.g. solar panels)
- In home display of energy usage
- Lots of technology:
 - Broadband, Wi-Fi...
 - Multiple laptops per home
 - Tablets, smart phones

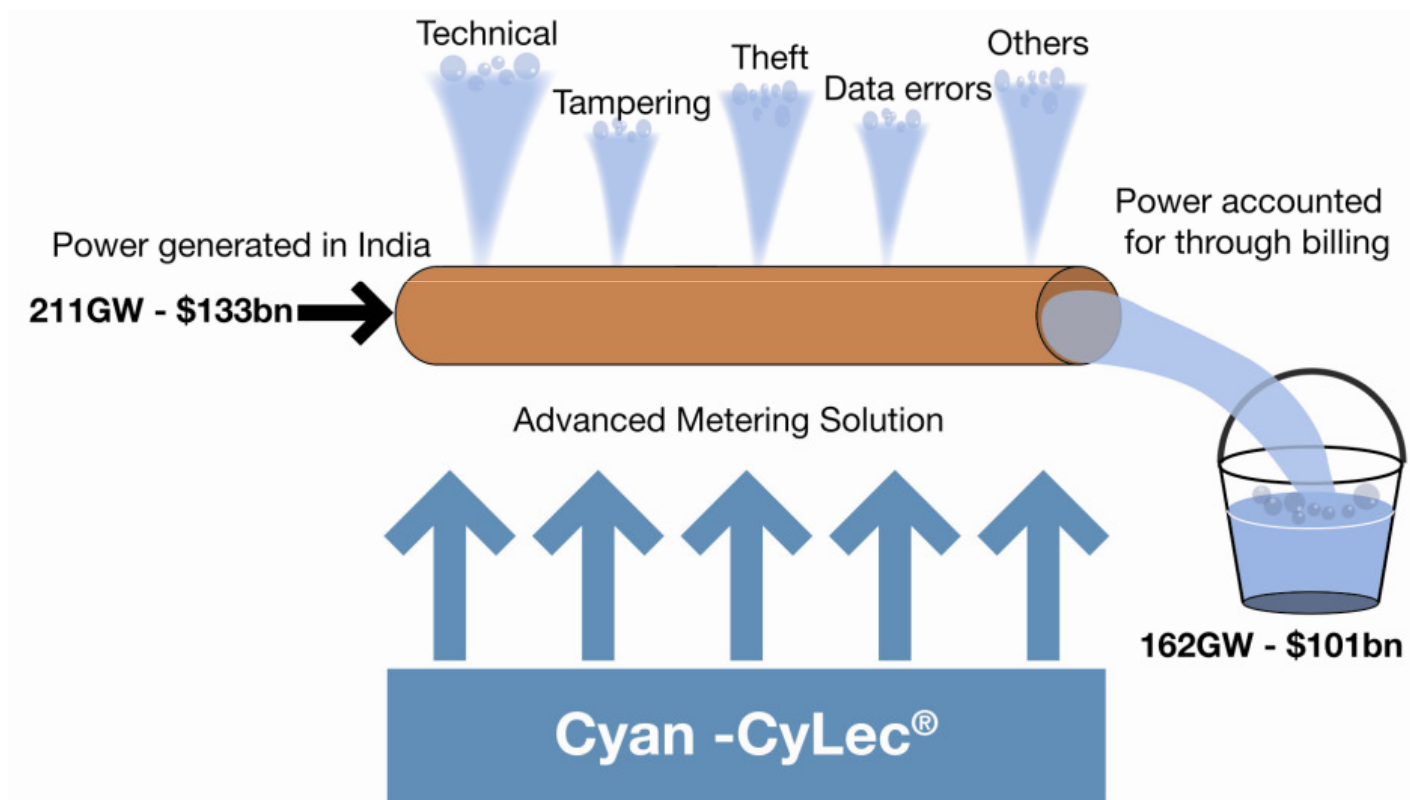


But more than 80% of humanity doesn't live like this...

- Rapid unplanned urban growth
 - Chaotic infrastructure...
 - Typical electricity bill <\$10 per month
 - Demand >> supply (regular power cuts)
- Inconsistent data (revenue loss)
 - Inaccessible meters: difficult to read
 - Limited mapping of dwellings
 - Multiple meter data formats/protocols
- Significant tampering
 - 35KV, magnet, open cover...

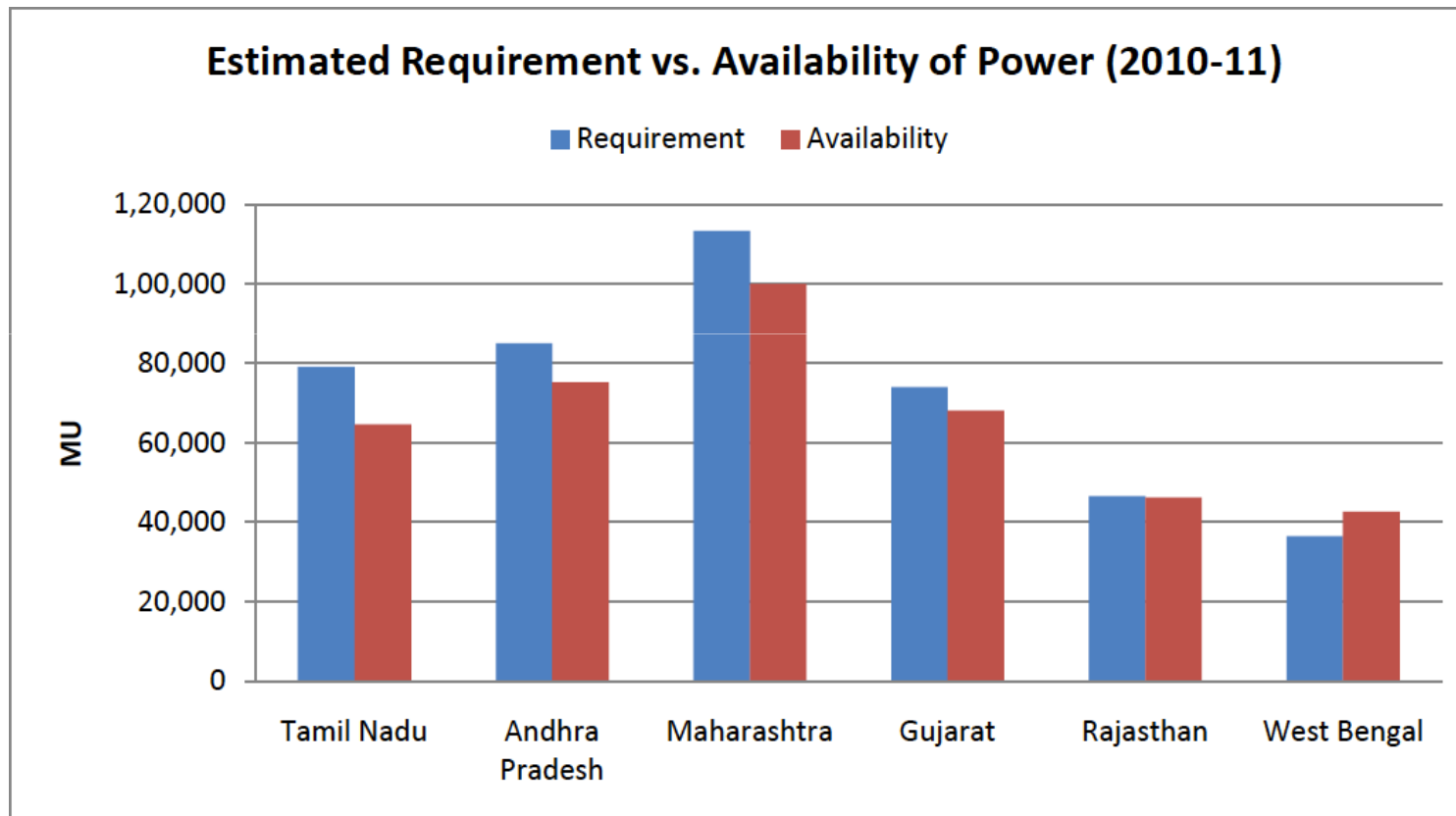


- 49GW loss/leakage on Indian grid: worth \$32bn (~1.7% of GDP)



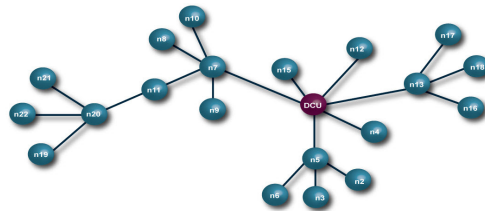
Aggregate Technical & Commercial (AT&C) losses

Frost & Sullivan's Inputs on India's Crippling Power Infrastructure, Published: 24 Aug 2012
<http://www.frost.com/sublib/display-market-insight-top.do?id=265368525>



Source: Athena Infomatics

- Enable the local ecosystem
 - Government, utilities, system integrators, and meter vendors
 - Deliver AMR/AMI that meets local cost and performance requirements
- Example: L&T and Cyan Partnership
 - L&T: meter to system integration
 - CyLec enabled meters
 - Head end integration



- Straightforward meter upgrade for Smart Grid
 - Interoperable comms using standard UART interface
 - Complexity handled at the server (not the meter)
 - Use and enhance existing proprietary protocols
 - Avoid adding unnecessary cost to the meter
- Cyan radio expertise:
 - Full mesh: several hops with self forming and healing
 - Low cost PCB antenna design: 433, 470, 865 MHz
 - Tuning of antenna to casing for high performance
 - 60-100m range in dense urban conditions



CyLec-Node

- Meter protocol enhancements: *CyLec Open Meter Protocol*
 - Very limited processing resources for smart meter functionality
 - Market will not stand an extra 50¢ per meter (micro controller)
 - Verbose protocols also add cost when transferring data over GPRS
- The CyLec-OMP
 - Tailored to regional (Indian) utility requirements – and OPEN
 - Very minimal processing resources: *8Kbyte flash and 60 bytes SRAM*
 - Optimised for fast/short meter data transfer over RF and GPRS

*Instantaneous, billing report, and tamper summary: **2.5s***

*Billing history, 90 day load survey and full tamper: ~ **28s***

- Risk management

- Step by step approach mandated by many utilities
- Maximise return from investment at each stage
- Consider integration with existing business processes
- Avoid “stranded assets” with no upgrade path

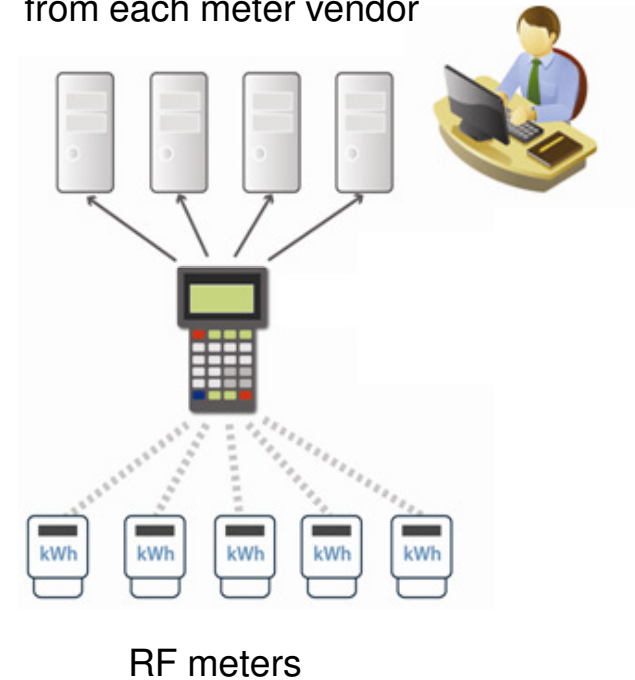


- CyLec migration path

- Start with robust “walk by” Automated Meter Reading (AMR)
- Use robust AMR to deliver significant improvements in data flow
- Then move to Advanced Metering Infrastructure with CyLec-AMI

- CyLec-CMRI* software
 - Menu driven meter downloads over RF
 - *Proven in field with extensive trials*
 - Compatible with multiple meter vendors:
- CMRI hardware
 - Partnership with Chennai based *SANDS*
 - Used throughout India for 12+ years
 - Robust proven technology

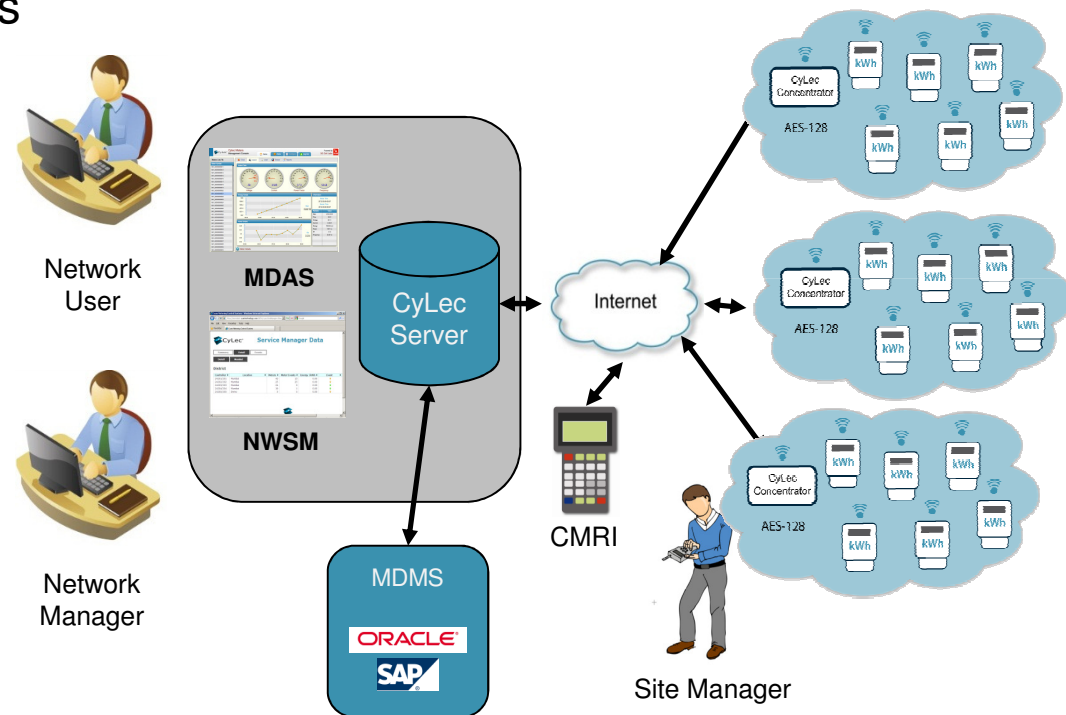
Base control Systems
from each meter vendor



**Common Meter Reading Instrument (CMRI) for handheld readings*

- Bidirectional communication with remote meters

- Instantaneous readings
- Billing reports
- Load surveys
- Tamper reports
- Variable tariffs
- Load shedding
- Pre payment
- Remote disconnect
- Backward compatible with CMRI

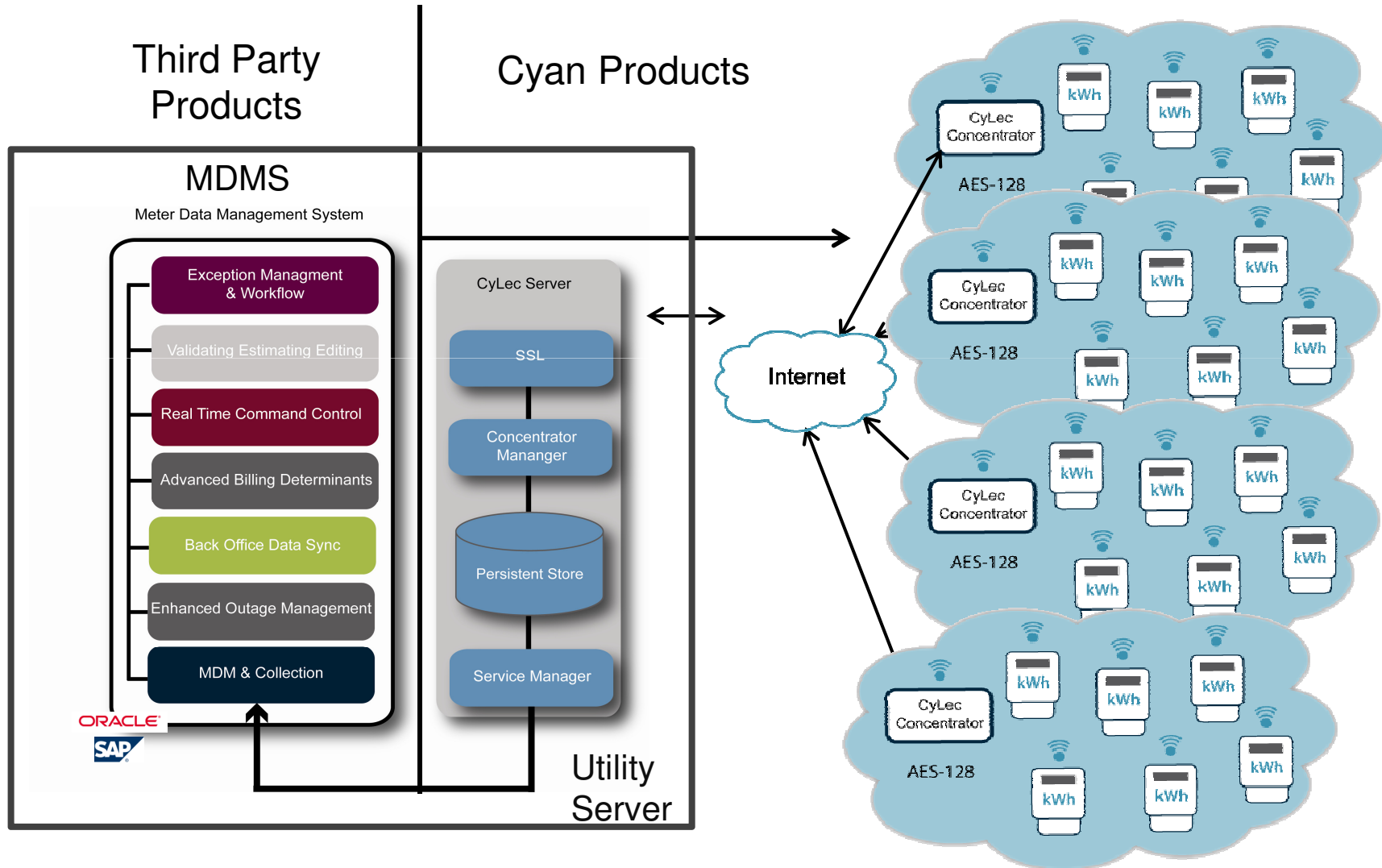



Network Service Manager (NWSM), Meter Data Acquisition System (MDAS), Meter Data Management System (MDMS)

- Third party meter data acquisition systems
 - Latest instantaneous data
 - Load surveys and tamper reports
 - Individual meter data
- Cyan network management portal
 - Online/offline indication for DCU and meters
 - Network topology mapping



Meter #	Meter Serial #	Location	Energy / kWh	Event
1	LHD0204	Unknown	602.51	🟢
2	LHD0209	Unknown	4171.63	🟢
3	LHD0205	Unknown	1222.01	🟢
4	LHD0154	Unknown	5385.69	🟢
5	LHD0271	Unknown	295.31	🟢
6	LHD0268	Unknown	1.32	🟢
7	LHD0276	Unknown	1587.13	🟢
8	LHD0264	Unknown	1483.24	🟢
9	LHD0268	Unknown	376.09	🟢
10	LHD0263	Unknown	1823.06	🟢
11	LHD0275	Unknown	1942.31	🟢
12	LHD0268	Unknown	2345.70	🟢
13	LHD0266	Unknown	1031.04	🟢
14	LHD0203	Unknown	1951.19	🟢
15	LHD0269	Unknown	3061.66	🟢
16	LHD0114	Unknown	2060.79	🟢
17	LHD0261	Unknown	2127.78	🟢
18	LHD0127	Unknown	1846.18	🟢
19	LHD0122	Unknown	508.00	🟢



- Partnerships  *LARSEN & TOUBRO*
- Substantial traction in India: multiple pilots and trials
- Secure, scalable, meter to enterprise solution
- Simultaneous AMR and AMI operation – upgrade path
- Interoperable with multiple meter types
- 1 & 3 phase meter support
- Sub 1GHz radio mesh: ideal for challenging environment
- Currently deployed in both AMR and AMI installations