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Smart Metering – Communication Network Need, Selection and Comparison

Communication Technology for Smart Metering- Parameters for Selection

- Reliability and robustness
- Performance to meet SLA targets
- Cost – Capex and Opex
- Security, data protection and privacy
- Longevity of solution
- Implementation experience
- Future proof for additional use cases and applications post deployment
- Conformance with published government Standards

Communication Network

Reliability and Robustness

RF Network

- a multi hop mesh network does not require all meters to be within range of a gateway
- Self-forming and self-healing features of mesh network provide additional resiliency that cellular only solutions cannot provide.
- **End to end IP based link**. The End device is directly discoverable and addressable by the host computer.
- Fix and forget – Minimal maintenance as system is self healing and configuring
- Long range to cover large rural area at a lower cost
- Deploy pocket wise to attack the high losses areas to reduce overall state AT&C losses
- Supports a slick installation process for tens of millions of smart meters – **Self-discovery, Auto registration and device management over the dedicated NMS** of the RF mesh. Roll outs with GPRS will require a centralized SIM management system.

Reliability and Robustness

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Choice , Convenience , Conservation & Efficiency

- The prime consideration for choice of technology is cost per point . Though GRPS has become relatively cheaper , but still expensive for mass rollouts and not viable in terms of channel capacity of network operators and remains restricted to scattered customer base .
- RF mesh technologies are much cheaper option in dense urban deployments to GRPS by a factor of 1.5 to 2 . Beside this it has a much lower recurring cost of running.
- RF technologies provide much better data throughput capability – well cater the need of time critical application (DSM/Load Control/Outage) which required quick transfer of small burst of data through the network.
- Use of Public network (GPRS/3G) poses the risk of availability and security.

RF Network – Coverage & Capacity

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Sparsely populated Area (Rural & Tea Garden)
D = 400m: Min10 nodes, average distance: 168m
D = 1000m: Min 20 nodes, average distance: 153m

Urban Area : Recommended 200 nodes in mesh network

Performance to meet SLA targets

- **Low Success rate** - Experience of deployment of GPRS based metering points in India, the data collection efficiency is typically 70 – 80% for meter reading on frequent poll basis. Further this drops down to about 50% on 30 minutes basis.
- **QoS issues** - To optimize the network bandwidth GPRS connections are not kept in context (PPP), they periodically connect with APN and each time connection to HES requires authentication from core GPRS servers which takes minimum 50-60 seconds.
- **Self healing** - In case of RF, data collection does not stop even in case of cellular outages with the ability to self-healing and self-forming, allowing smart meters to join another mesh network where backhaul network is available.

Standards

- GPRS network in India is IPv4 and not IPv6
- 3G/LTE is IPv6
- Standards IS16444 (Part 1 and Part 2) and IS15959 (Part 2 and Part 3) for smart meters and smart meter communications in India have evolved over last two to three years.
- Narrowband RF Mesh technology provides the IPv6, 6loWPAN and various RPL, RFC standards as specified and is fully compliant with all requirements as published in the Standards.

Security

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GPRS – Threats

- Fake identities: Someone takes the identity of a meter
- Tamper with communication: Someone tampers with the communication sent between the HES and meters.
- Cellular Jamming
- Repudiation: Meter denies receiving a message or the sending of a message.
- Eavesdropping: Someone eavesdrops on communication between a meter and the HES

RF mesh

- Encryption (AES128)
- DTLS Sessions
- Public Key Infrastructure(PKI) over IPv6
- Certificate based security
- Hardware Security

TCO - 10 years

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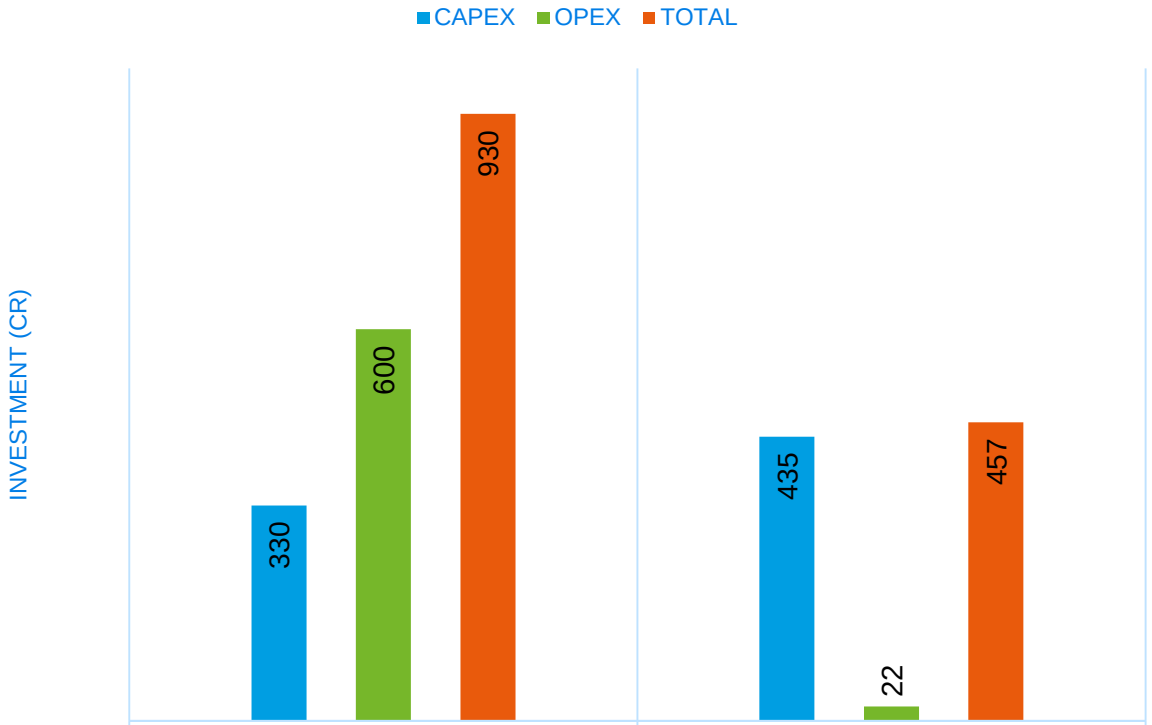
NETWORK COST FOR GPRS VS RF MESH FOR 5 MILLION METERS OVER 10 YEARS



	GPRS	RF MESH
CAPEX	330	435
OPEX	600	22
TOTAL	930	457

- Difference in TCO is 473 Cr over the period of 10 years.
- Investment cost for RF Canopy & RF Module is 457 Cr.

TCO - 15 Years

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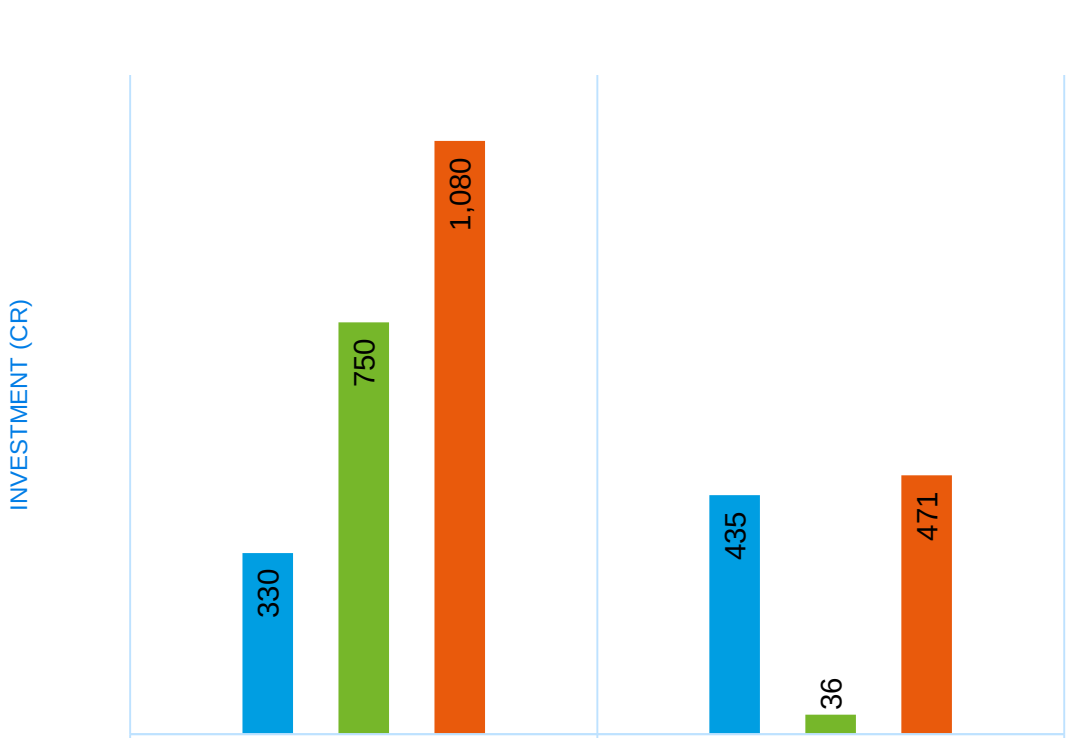
NETWORK COST FOR GPRS VS RF MESH FOR 5 MILLION METERS OVER 15 YEARS



	GPRS	RF MESH
CAPEX	330	435
OPEX	750	36
TOTAL	1,080	471

- Difference in TCO is 608 Cr over the period of 15 years.
- Investment cost for RF Canopy & RF Module is 471 Cr.

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Thanks