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SmartGrid RTD 2013

FNSNF

iPRP - the Parallel Redundancy Protocol for IP Networks

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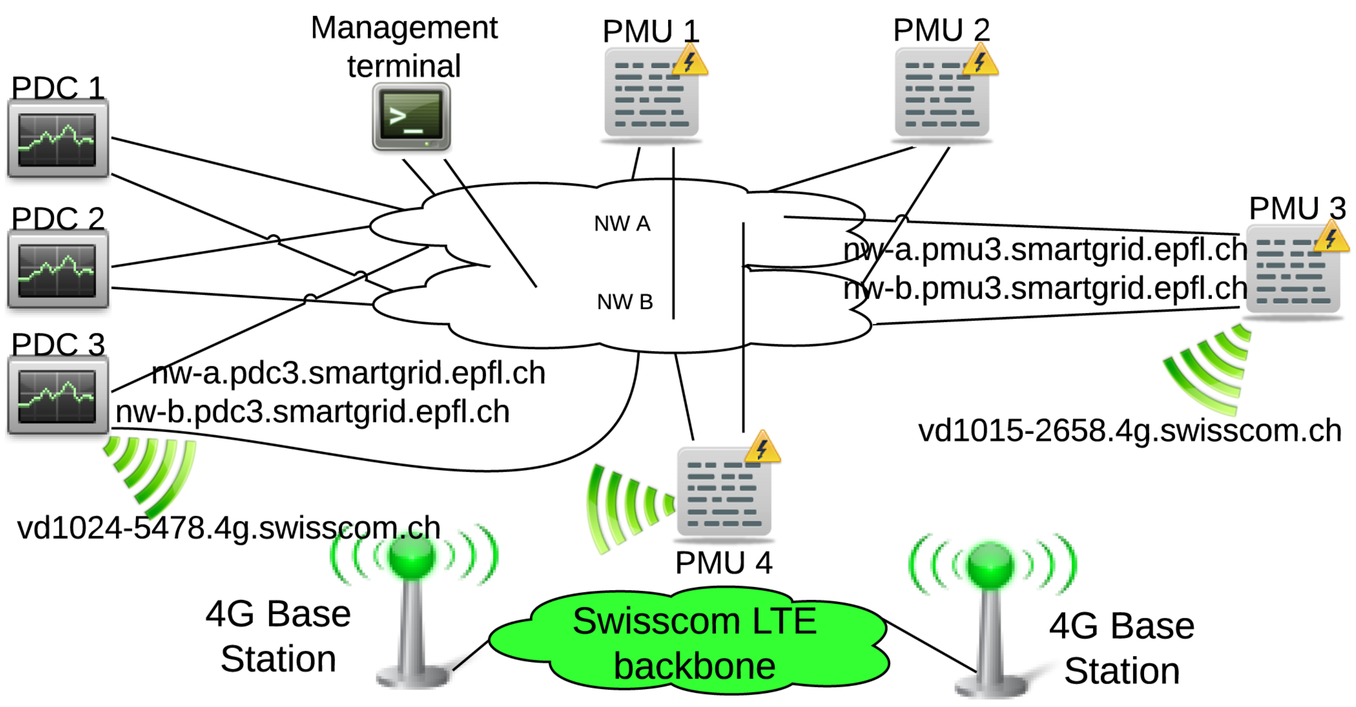
Problem: Reliable Data Delivery in WAN Over Redundant IP networks

- Focus on mission-critical applications, e.g., smart grid, high-frequency trading, distributed online gaming, process control in chemical industry…
- Relevant requirements of such applications:
  - ❑ Minimal packet loss
  - ❑ Hard delay constraints in the order of few milliseconds (UDP traffic)
  - ❑ Support for IP multicast in WAN environment

Solution: iPRP - the Parallel Redundancy Protocol for IP Networks

- Inspired by PRP (Parallel Redundancy Protocol) – MAC-layer solution.
- Designed as a transport-layer solution.
- Achieves reliability by packet replication.

Smart-grid use case - the role of iPRP



- ❑ On the sender side (PMUs): packets are replicated and sent over fail-independent networks.
- ❑ On the receiver side (State Estimator): first copy of a replicated packet is forwarded to the application and all subsequent replicates are discarded.

Why is it so good?

- ✓ Ensures 0ms switchover.
- ✓ Applications are unaware of the replication process.
- ✓ Routers are unaware of the replication process.
- ✓ Supports IP and multicast.
- ✓ It is soft-state; devices can join/leave/reboot at any time.
- ✓ Selective packet replication.
- ✓ It comes with network diagnostic tools.
- ✓ One-way delay improved as a side-benefit.

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* M. Popovic, M. M. Maaz, D.-C. Tomozei and J.-Y. Le Boudec. iPRP: Parallel Redundancy Protocol for IP Networks. 11th IEEE World Conference on Factory Communication Systems, Palma de Mallorca, Spain, 2015.