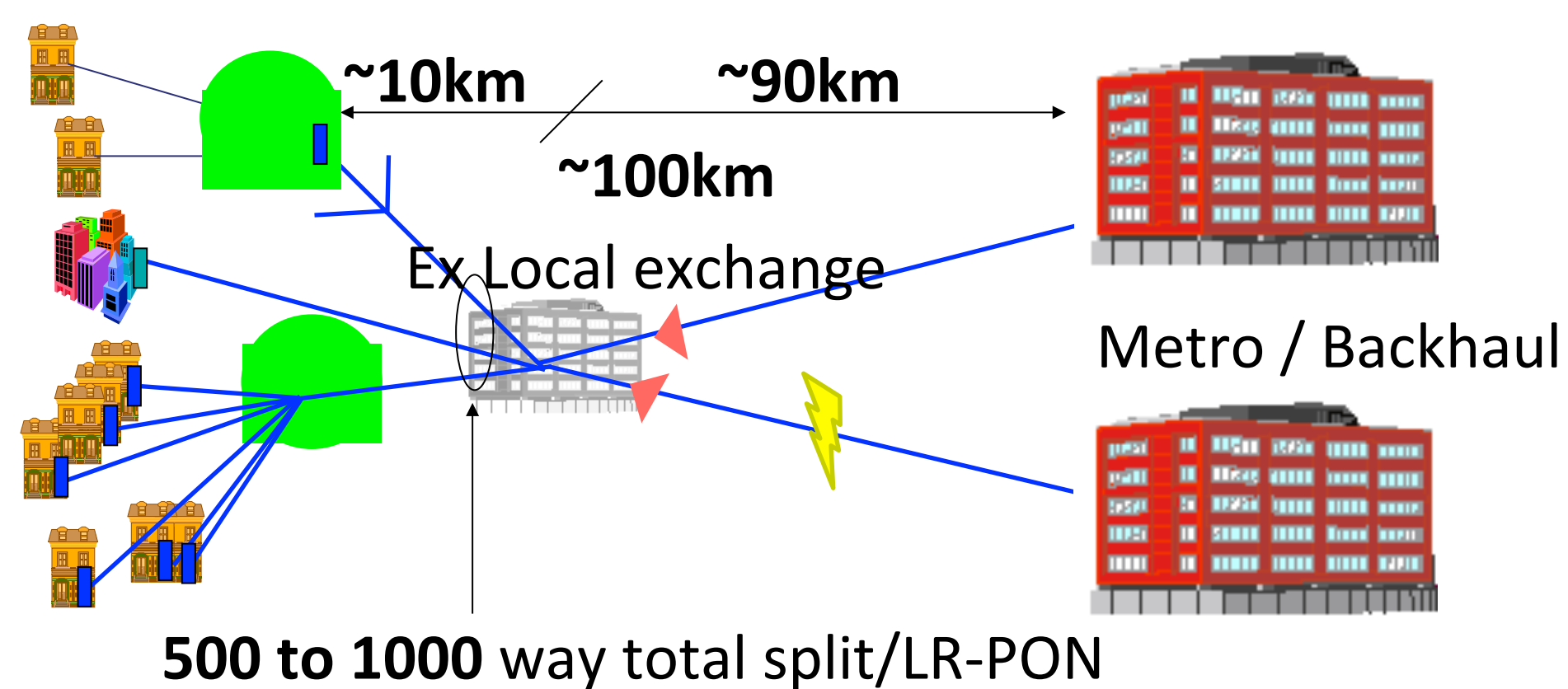


A protected LR-PON deployment for the UK

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LR-PON protection

- Long Reach PONs achieve economical efficiency by:
 - increasing the optical reach → 1000's of local exchanges can be removed
 - increasing the split ratio → a PON is shared among 500-1000 customers



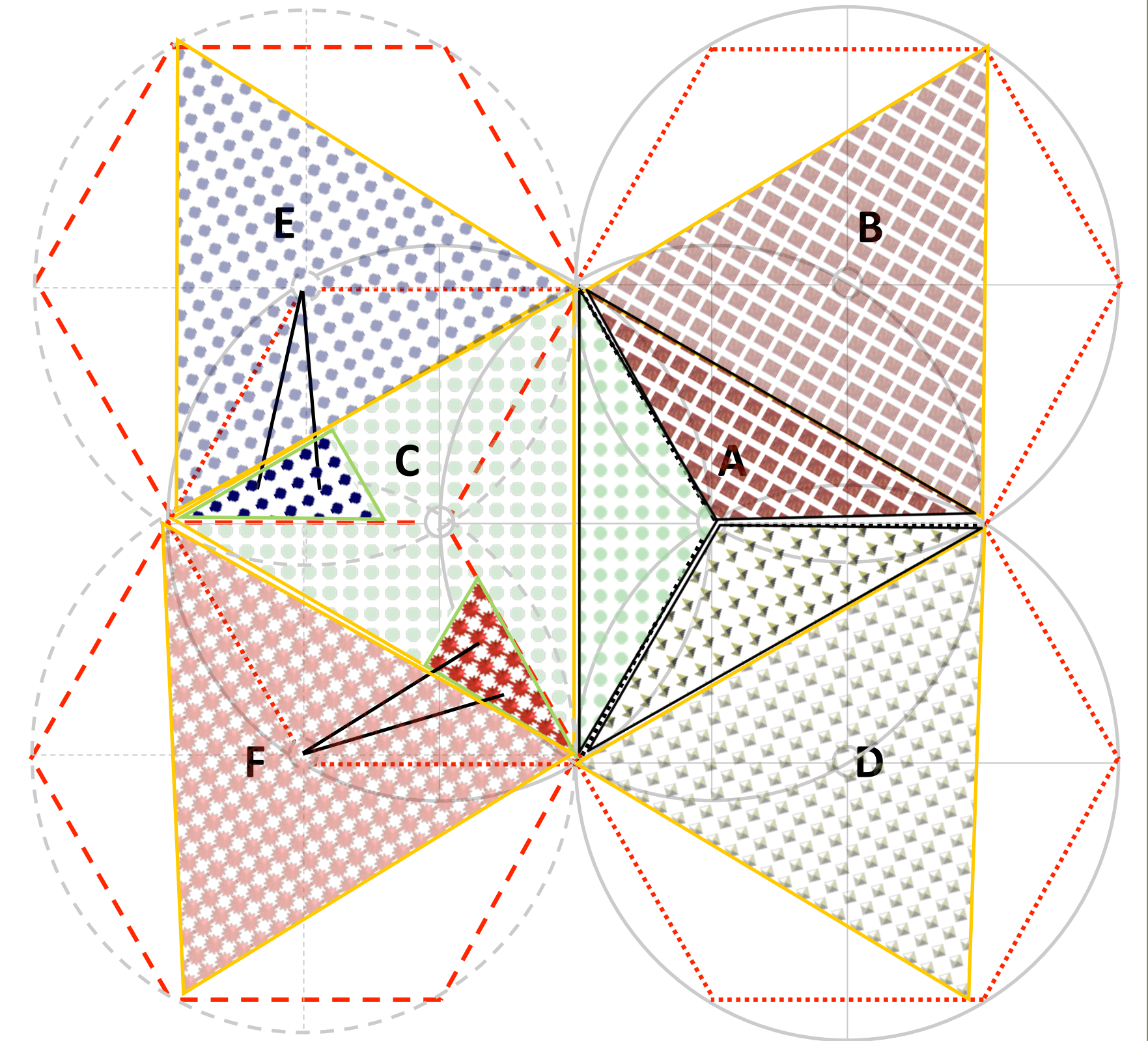
- Long reach means that fiber cuts are more likely
- Larger share means that the smallest failure will affect 500-1000 customers – cable cut will affect 10,000s

→ Protection becomes of paramount importance!

Dual-Homing & load sharing

- Protection needs to be cost-effective: cannot double the cost for residential customers

- We propose a novel protection mechanism based on IP load sharing that allows sharing protection load of any individual node over the entire network

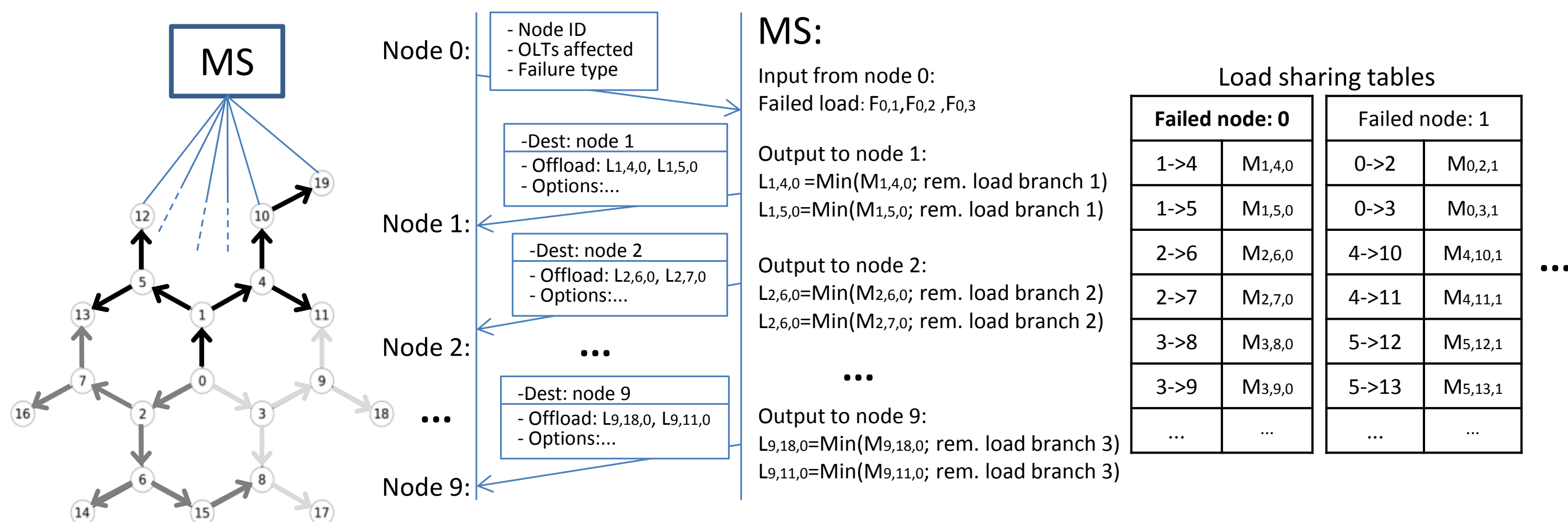


- With this structure each node:
 - provides primary IP coverage for the nearest PONs
 - provides backup coverage (i.e. protection) for PONs that are further away but still reachable

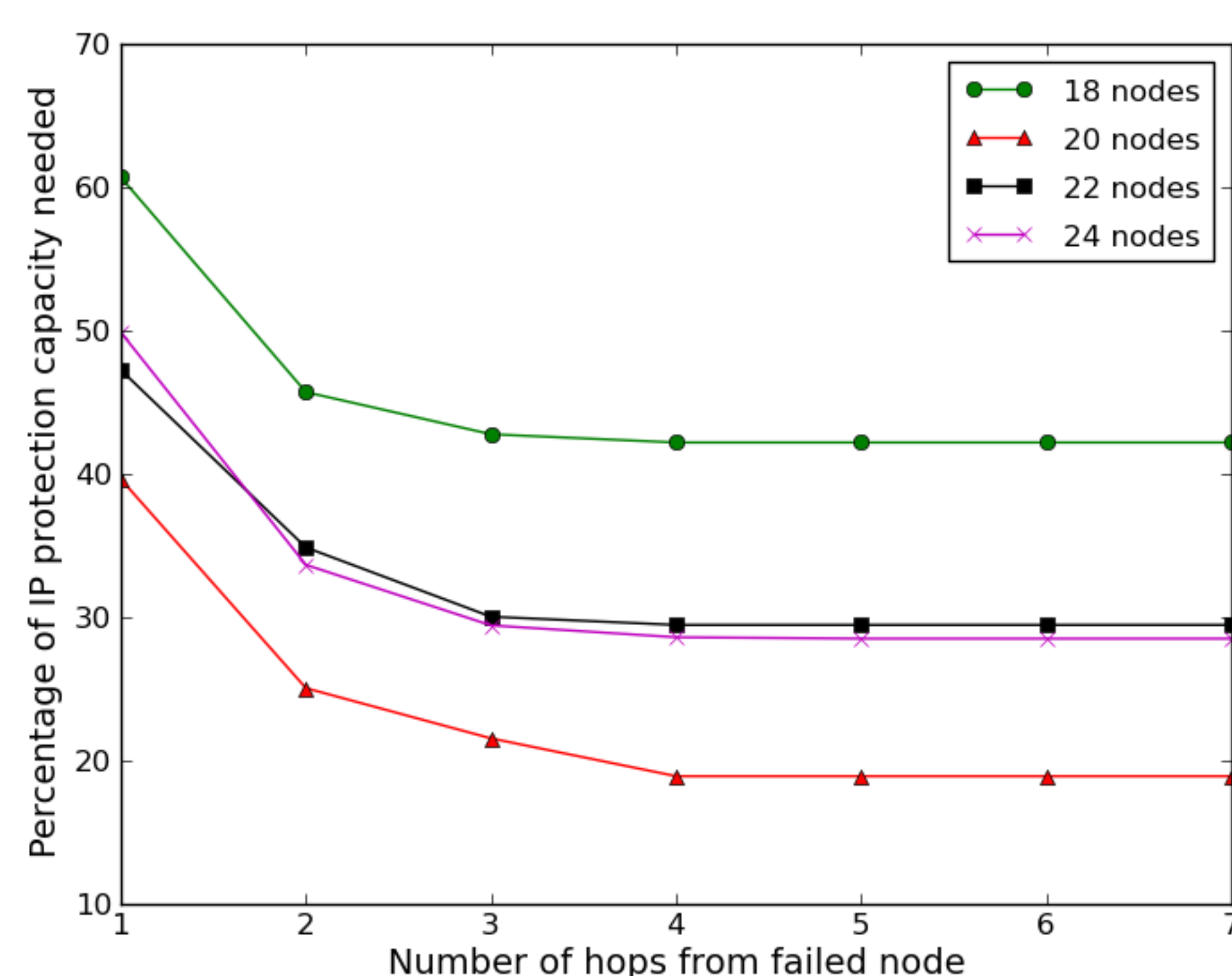
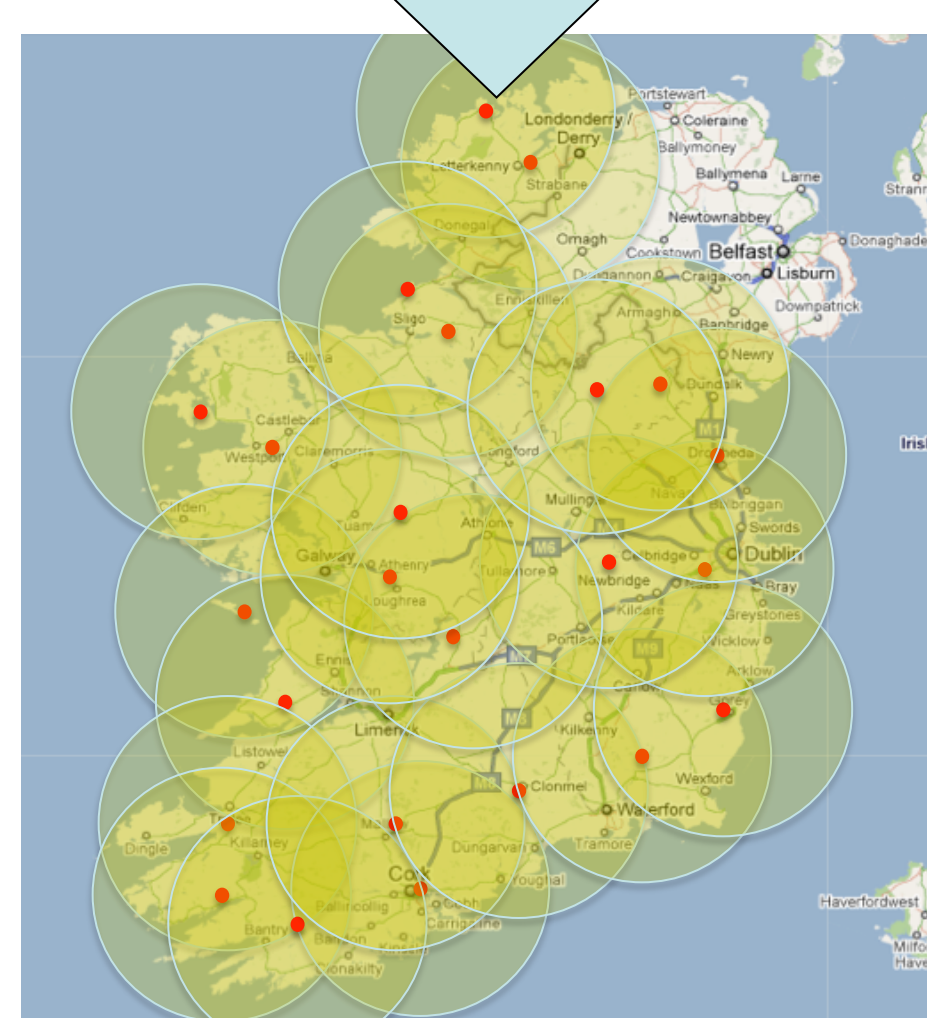
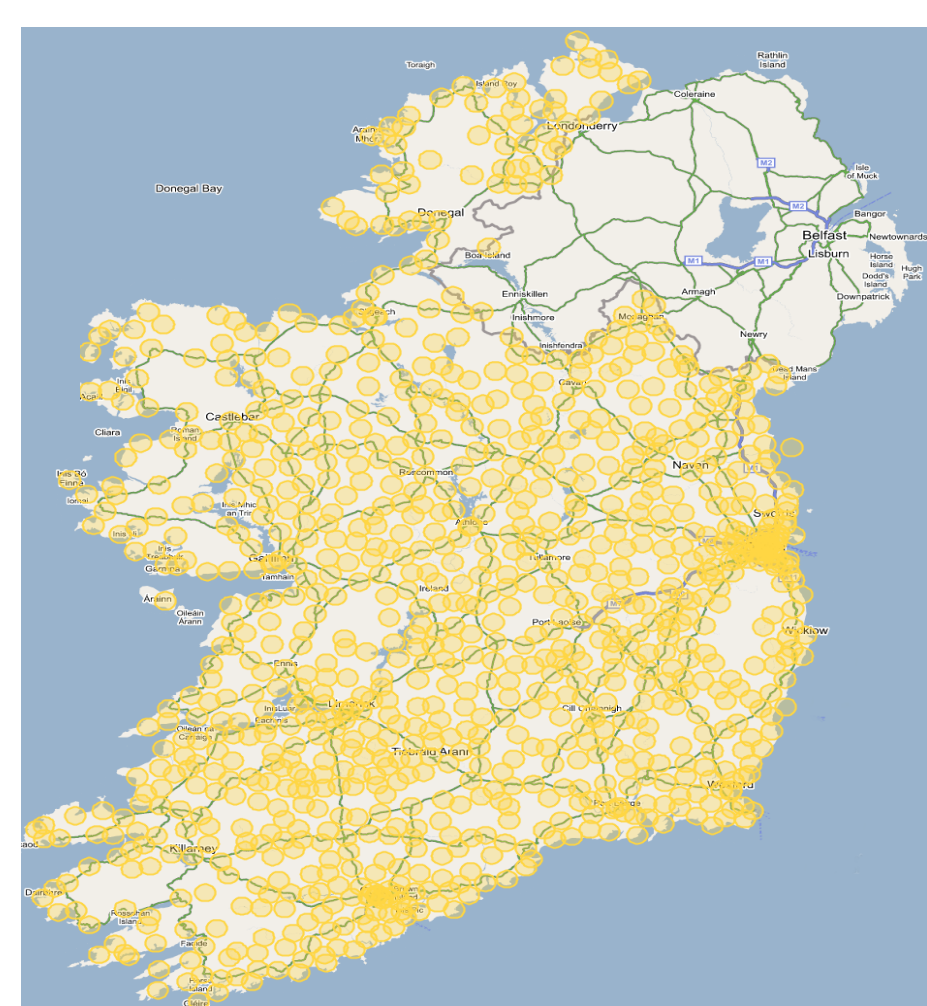
→ Protection against total failure of individual metro node is shared among adjacent nodes

Deployment case for Ireland

- The idea is implemented through a centralized management system



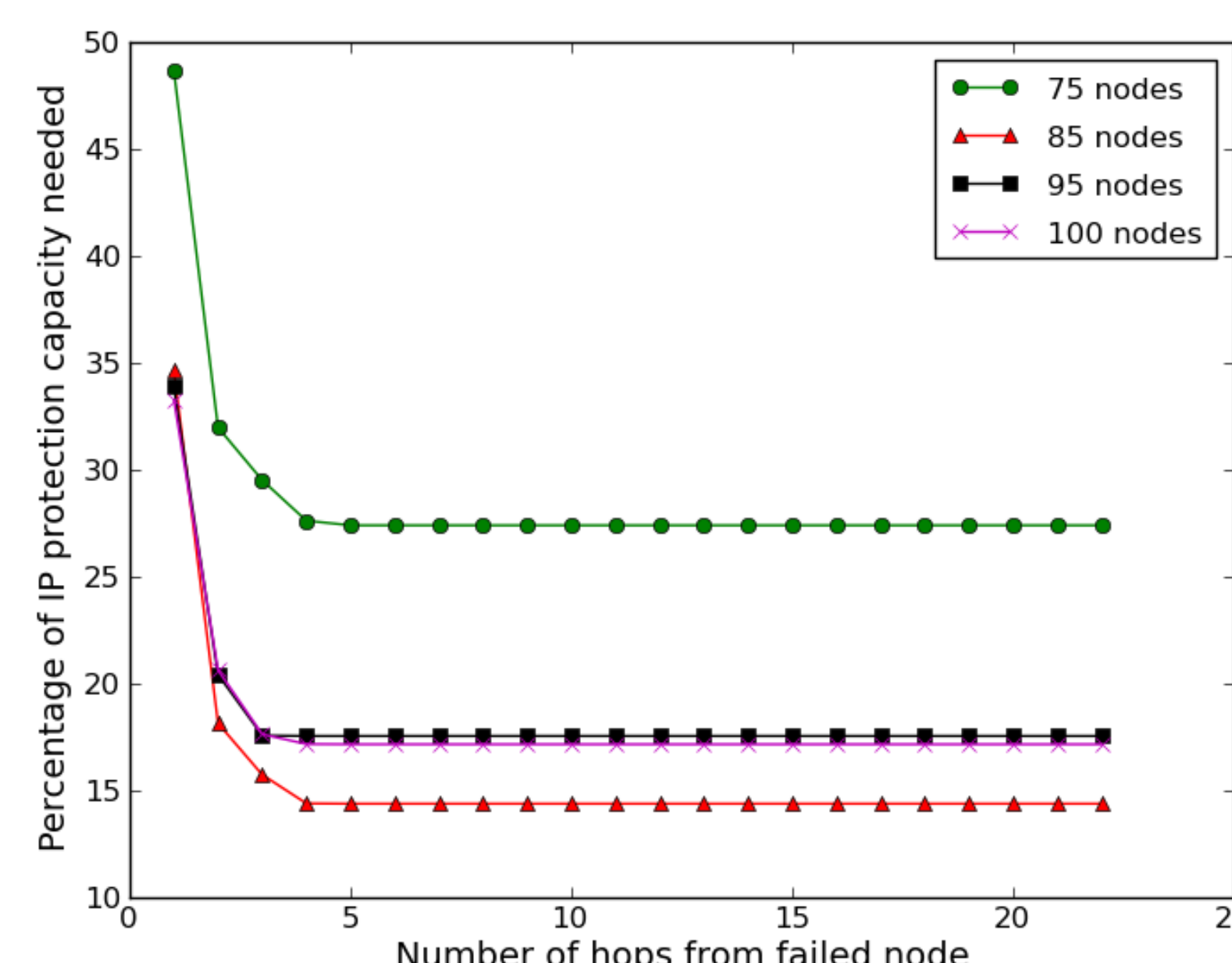
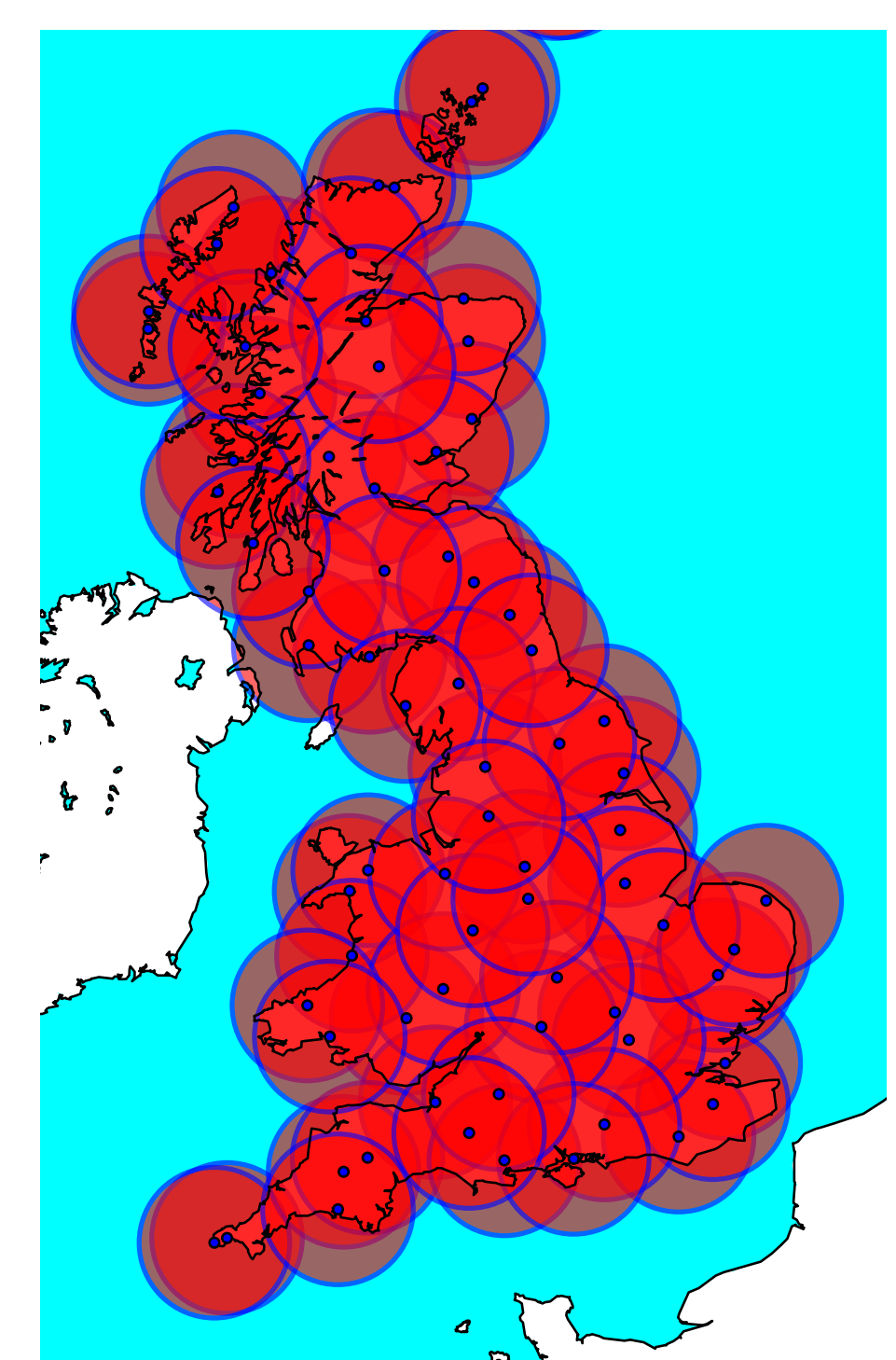
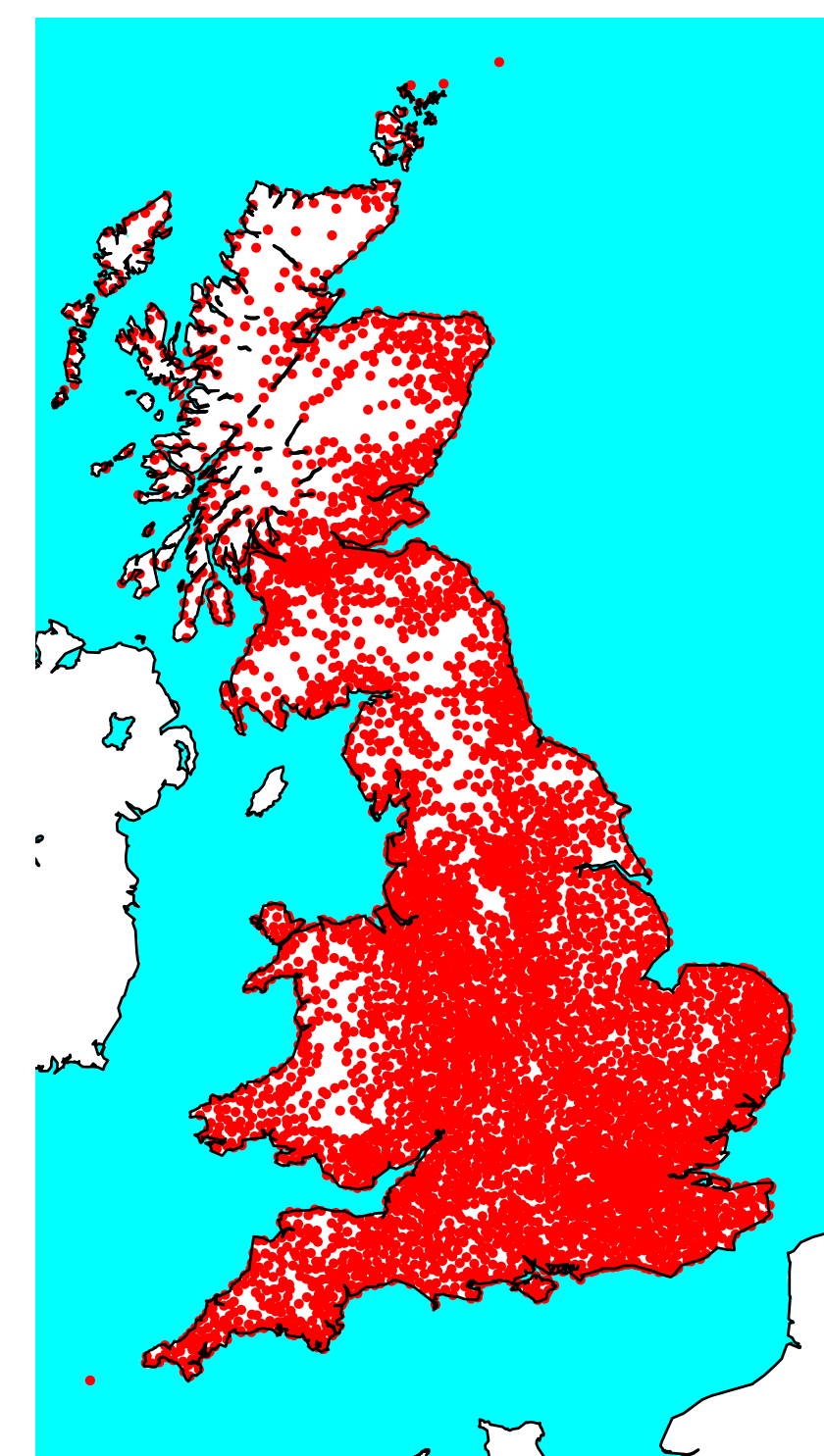
- From over 1000 local exchanges, to 18 metro/core nodes



- IP overprovisioning capacity can be substantially reduced, by up to 5 times compared to 1+1 protection

Deployment case for the UK

- From over 5000 local exchanges to 75 metro/core nodes



- Due to the larger topology and number of nodes, IP overprovisioning capacity can be reduced even further, by almost a factor of 7

→ This cut in protection capacity can produce substantial cost and energy savings.