Paper Review

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Joint Topology Design and Mapping of Service Function Chains for Efficient, Scalable, and Reliable Network Functions Virtualization

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Service Function Chain (SFC)
Joint Topology Design and Mapping (JTDM)

- Virtual node mapping
- Virtual link mapping
- Client requests set of SFCs, each has connected VNFs
- 2 or more VNFs may combine (i.e., implemented at same Telecom Cloud (TC))
- Each VNF differs in function and resource requirements
- Each substrate node (TC) also differs in functionality and resource capacities
- The physical TCs are heterogeneously designed to support distinct network functions
- MFTC (multi-function TC) can offer multiple network functions.
Given aforementioned inputs and constraints, following 2 sub-problems need to jointly solved:

- Design virtual topology for each SFC (where one or more VNFs may be combined)
- Map designed topology to substrate network
Differences : VN Mapping Vs JTDM

- Virtual topology in VN mapping is given in advance
- Either virtual node or substrate is homogenous
- JTDM allows many-to-one VNF mapping called VNF combination
- VNF combination leads to trade-offs as shown in Fig.
JTDM Problem

- Distributed and Heterogeneous Telecom Clouds
- SFC Requests
- The Joint Topology Design and Mapping Process
  - VNF Combination Process
  - SFC Mapping Process: includes VNF mapping and virtual link mapping
Closed Loop with Critical Mapping Feedback Algorithm (CCMF)

- CCMF used to solve the JTDM problem
- Leverage feedback from the critical sub-topologies (CS) of an SFC
Continued…

- Open-Loop with Maximum Combination (OMC)
Scalable JTDM

- Periodically Re-Optimize (PRO)
- Incremental Reconfiguration (IR)
Reliable JTDM

- NP – No Protection
- DP – Dedicated Protection
- SP – Shared Protection