Paper Review

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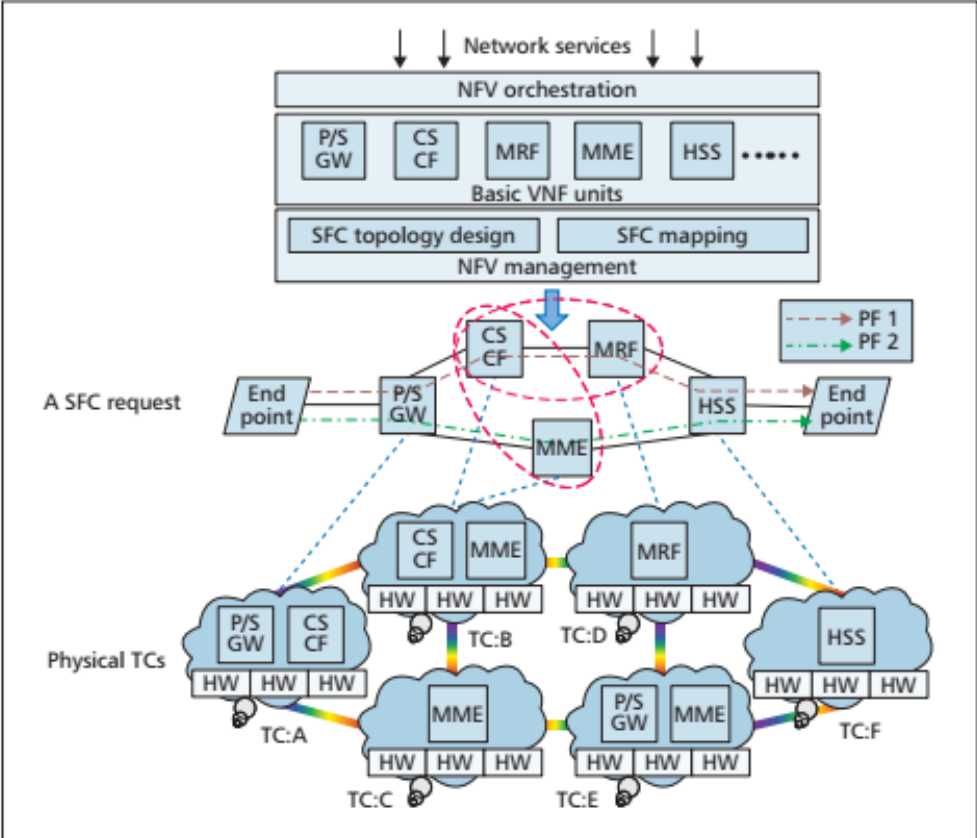
UCDAVIS

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

Z. Ye, X. Cao, J. Wang, H. Yu, and C. Qiao

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.

Continued…

- 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.
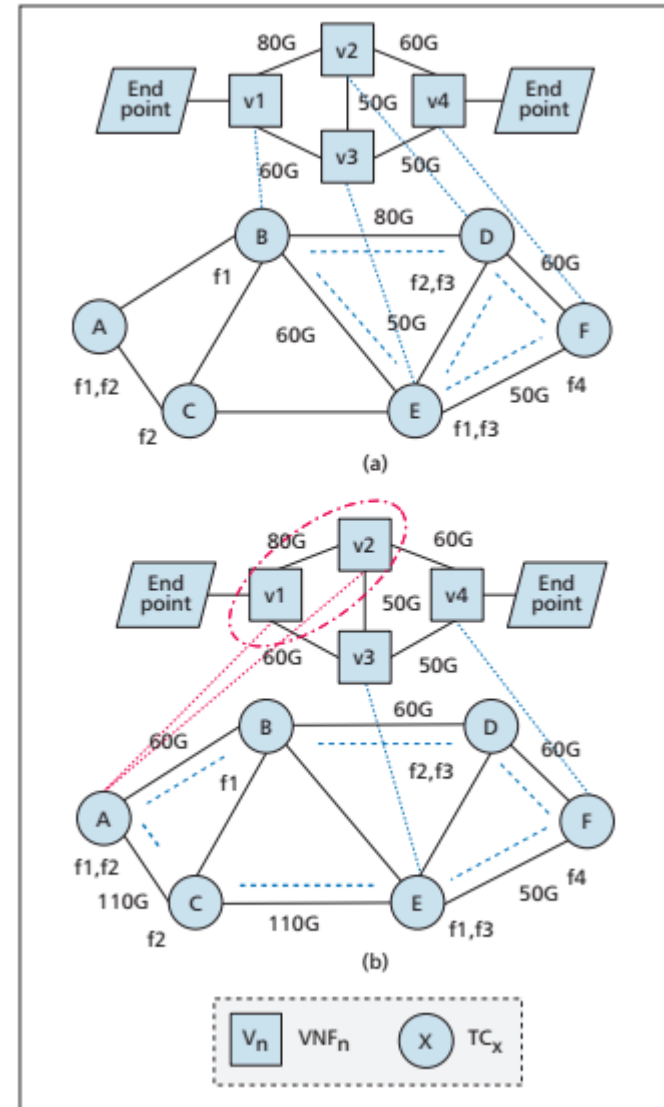
JTDM Problem

- **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**

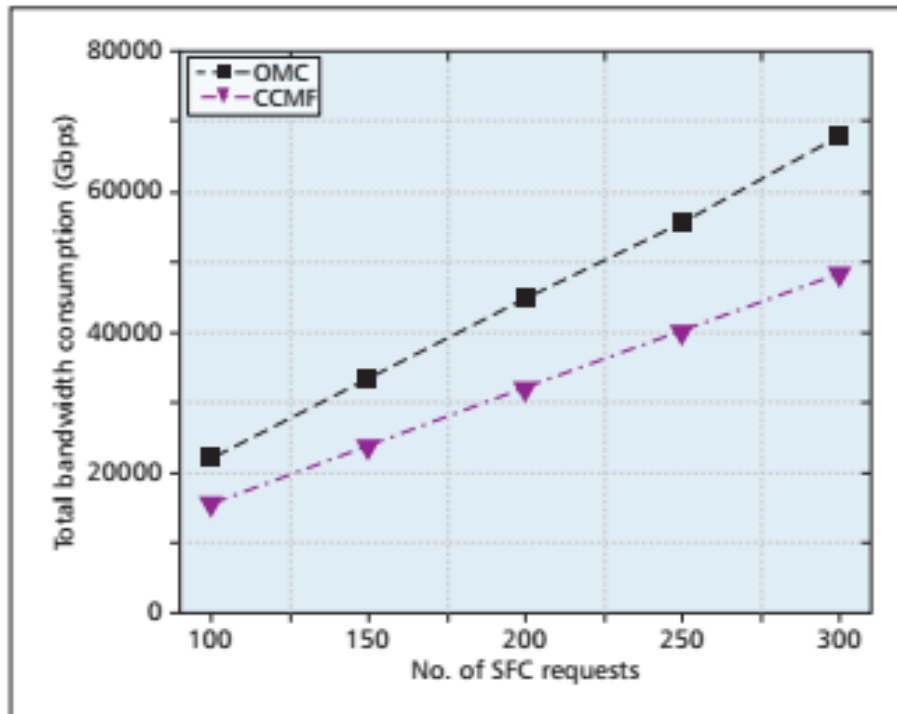# Closed Loop with Critical Mapping Feedback Algorithm (CCMF)

- **CCMF used to solve the JTDM problem**

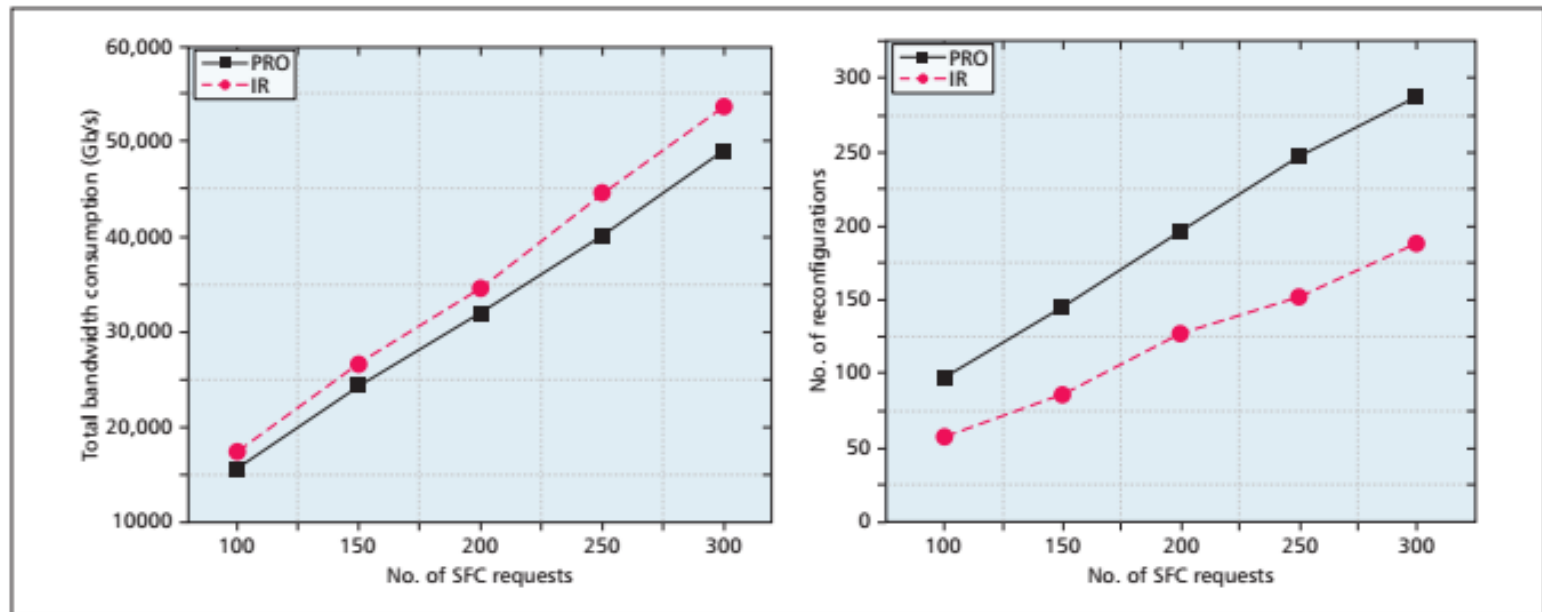- **Leverage feedback from the critical sub-topologies (CS) of an SFC**

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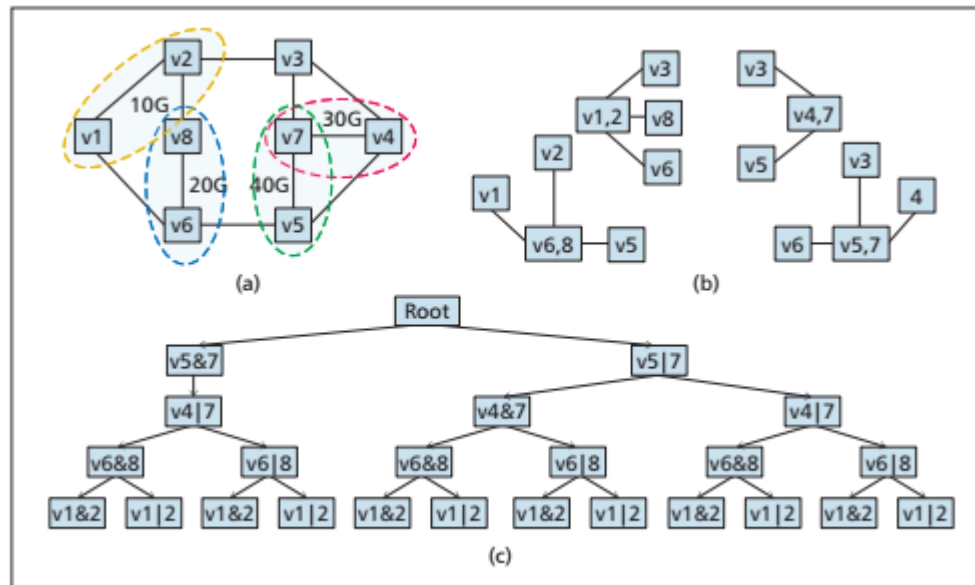
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- **Open-Loop with Maximum Combination (OMC)**

Scalable JTDM

- **Periodically Re-Optimize (PRO)**
- **Incremental Reconfiguration (IR)**

Reliable JTDM

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