Cisco DS-TE Lab Trial

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Background

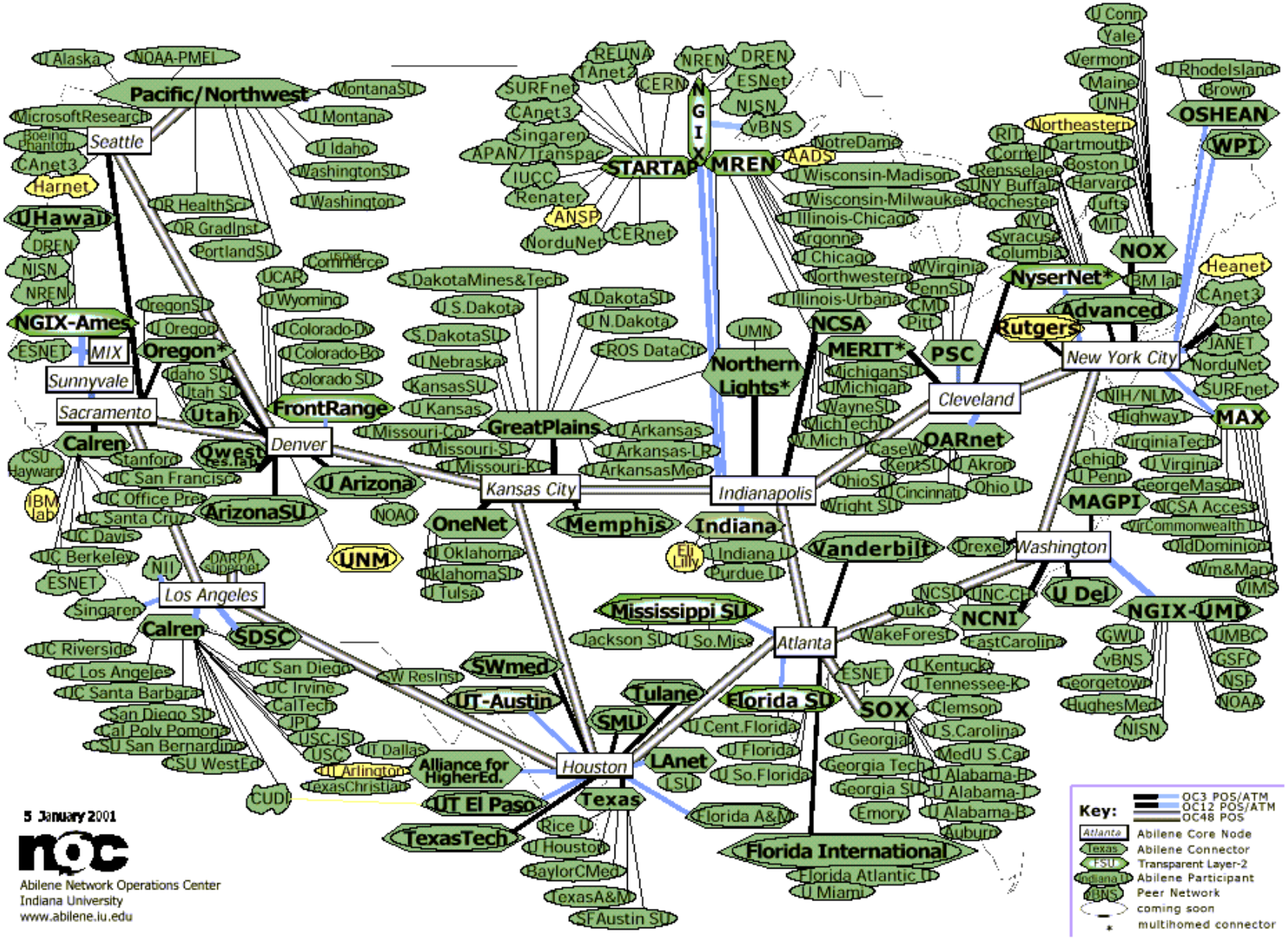
- Abilene backbone trying to implement a QBone Premium Service domain
- **Service goal**: EF edge-to-edge "virtual trunk"
- Cisco suggested that DS-TE might be helpful tool to complement MDRR, CAR, QPPB,...
- Learned enough to pique our interest
- Cisco and Internet2 agree to perform EFT
- Test suite developed and executed in lab by Internet2 ITECs

INTERNET2™

Abilene Topology

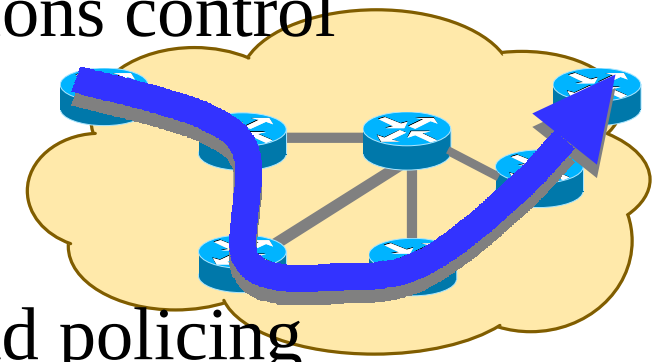
January, 2001

- 47 connectors
- 183 participants
- 34 connections to 20 peer networks



Early Hopes for DS-TE

- Before we were fully briefed, we thought DS-TE might give us...
  - Resource accounting / admissions control
  - Up-calls on constraint failure
  - Delay constraints too
  - "Trunk-style" classification and policing
  - Mechanism to protect PQ resources from non-policed connectors

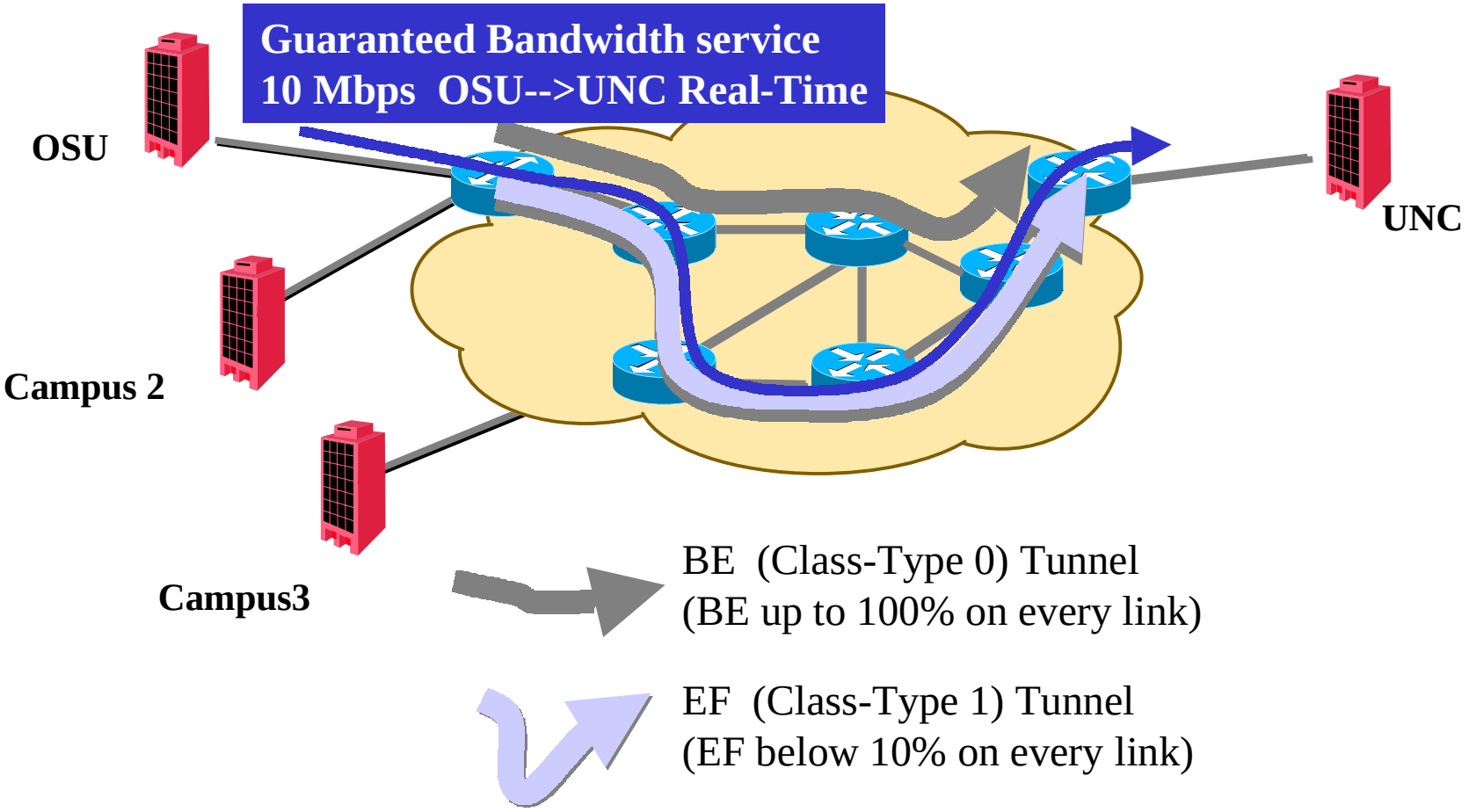


- After briefing, understood that DS-TE only addressed first item above

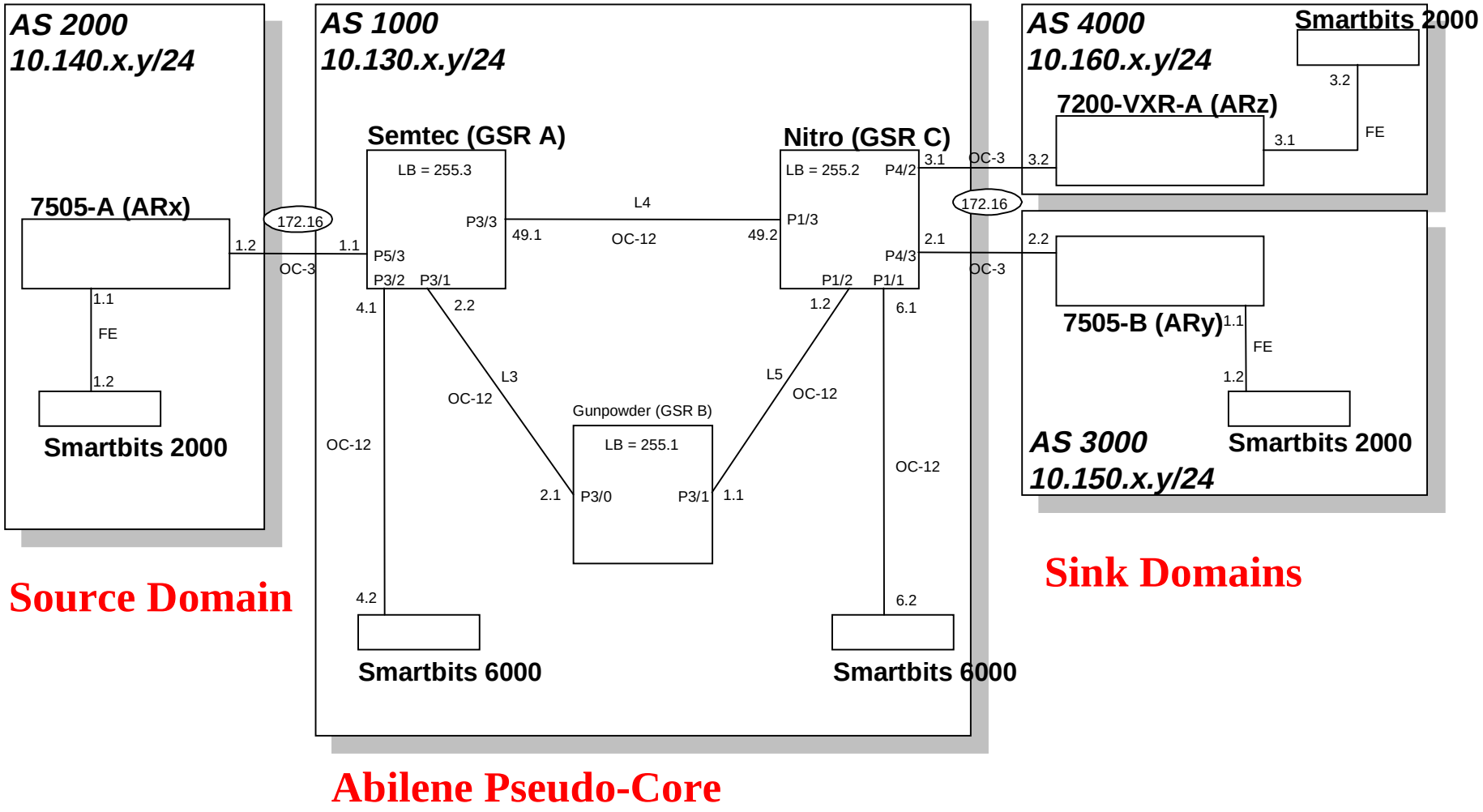
Implementation vs. Drafts

- Support for two Class-Types (CT0, CT1)
- CT1 bounded by "Max Reservable CT1" and by "Max Reservable Aggregate"
- CT0 bounded by "Max Reservable Aggregate" only
- Class-Types called "bandwidth pools"
- Pre-standard IGP extensions (*e.g.* use of Cisco-proprietary TLV in OSPF)

Abilene Premium Service Example



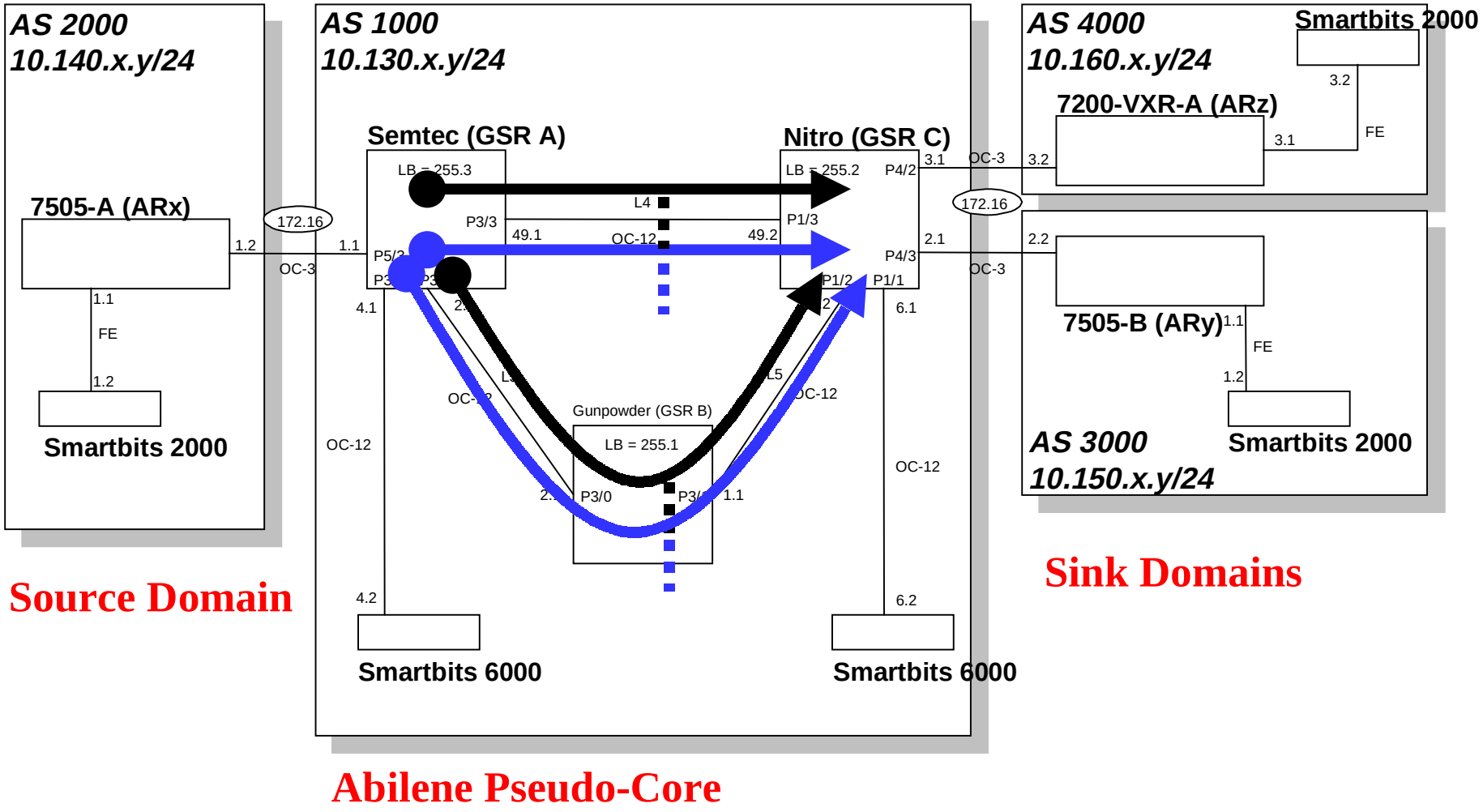
Test Network



Basic MPLS TE Verification

- Verification of Basic/Aggregate MPLS TE
  - Global Pool (Class-Type 0) bandwidth constraint mechanism
  - Route selection based on administrative weight
  - Re-routing on link failure
  - Verification of correct tunnel routing via CLI and by passing traffic

Test Network



DS-TE Lab Test Results$_{1/2}$

- DS-TE Extensions
  - Verified sub-pool route selection based on bandwidth availability:
    - e.g. Best Effort can get up to 100% of link capacity while EF tunnels were limited to the configured sub-pool budget
  - Achieves separate CAC and separate Route Computation for sub-pool tunnels
  - Verification of correct sub-pool (Class-Type 1) tunnel routing and forwarding

DS-TE Lab Test Results$_{2/2}$

- DS-TE Extensions (continued)
  - Verified sub-pool preemption mechanism (preemption orthogonal to b/w pool)
  - Successfully added MDRR PQ, CAR, and QPPB to approximate complete solution

Conclusions

- DS-TE worked as advertised
- Potentially useful tool in kit (if TE needed for non-Premium traffic)
- Complete test report to be made public "real soon now"™