**5G Slicing with Programmable Data Planes**

### Motivation

**Service classes in 5G networks**
- Enhanced mobile broadband (eMBB)
- Massive machine type communication (mMTC)
- Ultra-reliable low-latency communication (URLLC)

**Network slicing**
- Divide physical resources into slices (for different applications etc.)
- Tenants rent slices from infrastructure operator

### Implementation

Current implementations rely on architecture specific instructions [1, 2] → Restrict to vanilla P4 architecture-independent instructions [3]

**Investigated P4 targets**
- Software-based target using 14p4s [4]
- Hardware-based switching ASIC

### Measurement Setup

**P4 target as Device under Test (DuT)**
- Two tenants (A and B) use shared resources
- Baseline scenario: only one tenant runs
- Slicing scenario: two tenants run simultaneously

**Tenant A**
- Runs an Access Control List
- Total entries: 15 000 SW / 80 000 HW

**Tenant B**
- Runs a simple forwarder
- No table entries required

### Program Slicing

**Software target**
- Latencies close to respective baselines
- Small increase due to slicing overhead

**Hardware target**
- Tenant B’s latency shifts to tenant A’s baseline
- Intensive resource usage affects all tenants

### Hardware Slicing

**Two tenants with A and B**
- Latencies close to respective baselines
- Tenants do not affect each other
- Exclusive hardware slice for tenants

**Limitation:** number of available processing pipes of target

### Conclusion

**Software target**
- Performance limited
- Less interference between single tenants

**Hardware target**
- High performance
- Suffering from resource intensive tenants
- Hardware slicing eliminates interference
→ Estimation of service guarantee performance

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