**Introduction**

- One of the goals of SDN is to ease network management complexity.
- Many efforts for composing network policies exist but they only consider OpenFlow based switches[1-3].
- The SRv6 architecture (Segment Routing based on IPv6 data plane) is a promising solution to support services like Traffic Engineering, Service Function Chaining and VPNs.
- However, administrators still have to write these segments lists and instruct routers manually
  - Prone to human error.
  - Slow responding to dynamic changes.
  - Coordinate multi-tenancy support in data plane
  - Possible conflicts between route entries.

**Busoni**

- **Busoni**: is the first framework that addresses northbound interface challenges on top of SRv6 data plane.

- **Objectives**:
  - Building a policy framework on top of SRv6.
  - Automate segments lists creation and updates.
  - Providing means for policies creation and manipulation.
  - Automatic policies repairs in case of SLA violation.
  - Providing means for multi-tenancy support.
  - Optimizing segments lists eventually.
  - Resolve any possible conflicts in routing entries.

- **Architecture**: Overlay+SFC:

```
class OverlaySFIntent(Intent):
    def __init__(self, src, dst, qos, vnfs):
        super(self).__init__(src, dst, qos, vnfs)

def eval(self):
    addbehavior("T.Encaps", self.dstaddress, srcOrdst)
A = OverlaySFIntent(C:1:1', C:1A:1', None, [f1, f2])
A.eval()
```

**Example**: Responding to network updates

```
intentslist, typeopath = isitconnectedtointentorpath(nfid)
getsaction(r).run('''
Match (m:MiddleBox) [dpid: (MBdpid)]
Match (s:Router) where s.ip in (slist)
MERGE (m)-[r:Hosts]->(s) ON CREATE SET r.cost = (scostmb) return r:
'','')
merge MBdpid: "nfid", "slst" newrouter, "scostmb":
if isinstance(intentslist, basestring):
    updateintent(intentslist)
else:
    updateintents(intentslist)
```

**Prototype Implementation**

- Busoni was written in Python and uses Cypher to communicate with Gavel.
- Busoni facilitates gRPC as a channel to send segments’ lists management commands to routers (Linux based)[5].
- Busoni uses OSPF listener to get data plane updates [BGP-LS can be used as alternative][5].
- Busoni libraries provide means to fully customize (source range, destination range, behaviors, routing commands).

**Future Work**

- Conflicts resolution (IP range, routing types)
- Implement multi-tenancy usecase (VPN)
- Implement L4 policy routing
- Evaluating compilation time for policies and responding time for network updates

**References**

4. O. Barakat, et al., “Gavel: Software-defined network control with graph databases” IEEE ICIN’17