



# An over-the-top SDN architecture for mobile nodes and home routers

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# Overview

- Traditional SDN
  - Datacenters, WAN, campus networks, ...
  - End-nodes out of the picture
- Bring SDN all the way from the data-center to the end-nodes
  - Home routers & mobile devices
- Control the:
  - Source/egress
  - Destination/ingress
  - Path (to some extent)
- Appropriate SDN infrastructure required

# Motivation

- New and unexplored scenario
- Gap in the literature
  - Existing work on SDN for end-nodes does not consider the whole scenario
- Challenges differ from traditional SDN
  - Require new approaches or re-thinking current ones
- Design guidelines specific for the scenario
  - Allow to carefully build an optimized architecture

# Potential use-cases

- Control the source
  - Traffic offloading (Wi-Fi/3G)
  - Bandwidth aggregation
- Control the destination
  - Per end-node optimized CDN
  - Smart VPN services
- Control the path
  - Dynamic overlay routing
  - Cloud-based services
  - In-path functions

# Challenges

- Large number of controlees
  - Hundreds of thousands
- Scattered end-nodes
  - Worldwide scale
  - Spread across different locations
- Low traffic locality
  - Traffic not aggregated
  - Poor cache hit-ratio
- In-place networks
  - Legacy edge-networks
  - Heterogeneous technologies
  - Out of the SDN domain
- Transient devices
  - High churn on the system
  - Node mobility

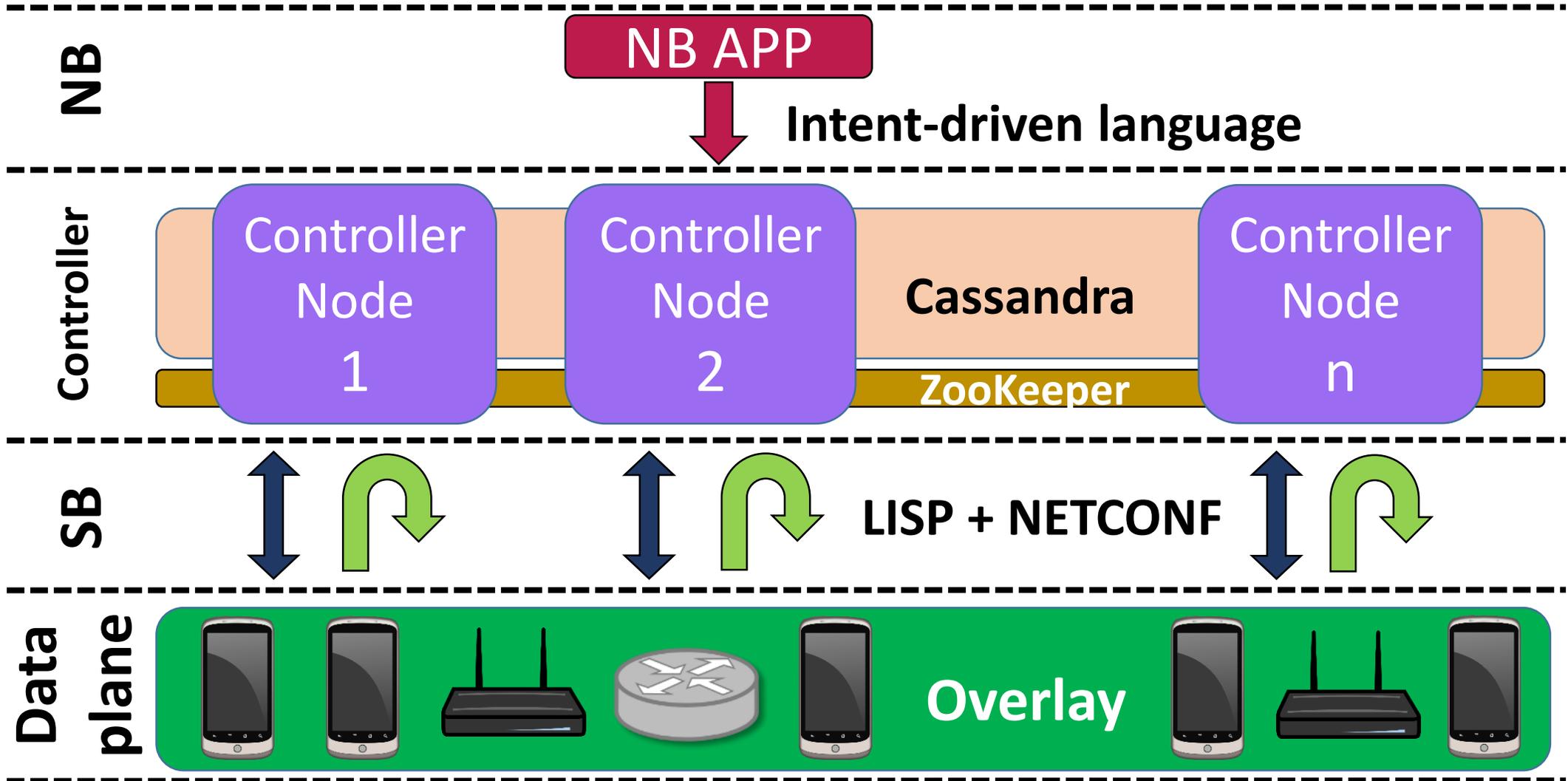
# Design guidelines

- Overlay approach (over-the-top)
  - Bypass legacy networks
  - Homogeneous view
- Scale-out controller
  - To handle the high number of southbound messages
- Decentralized, distributed and symmetric infrastructure
  - Southbound requests can come from anywhere
- Connectionless southbound
  - Decouple controlees from controller nodes
- Pull-based mechanism
  - State retrieval on demand
- IP granularity
  - Sufficient for most use-cases
- Intent-driven northbound
  - Group-oriented
  - Shared policies

# Design guidelines vs challenges

Challenges	Design guidelines						
	Overlay approach	Scale-out architecture	Distributed, decentralized & symmetric	IP granularity	Connectionless southbound	Pull-oriented southbound	Intent-driven northbound
In-place networks	✓						
Large # of controlees		✓			✓		✓
Low traffic locality		✓		✓			✓
Scattered nodes			✓		✓		
Transient devices			✓		✓	✓	

# Architecture



# Feedback request

- Comments on the scenario/architecture
- Additional challenges
- Missing design principles
  
- Shall we consider this scenario in SDNRG?

# Demo

- Ent-to-end scenario
  - From the datacenter to your phone
- Mobile-node with LISP & NETCONF support via LISPmob
- KVM virtual machine on a LISPmob enabled host