Communication-Aware Application Placement in Combined Fog-Cloud Computing

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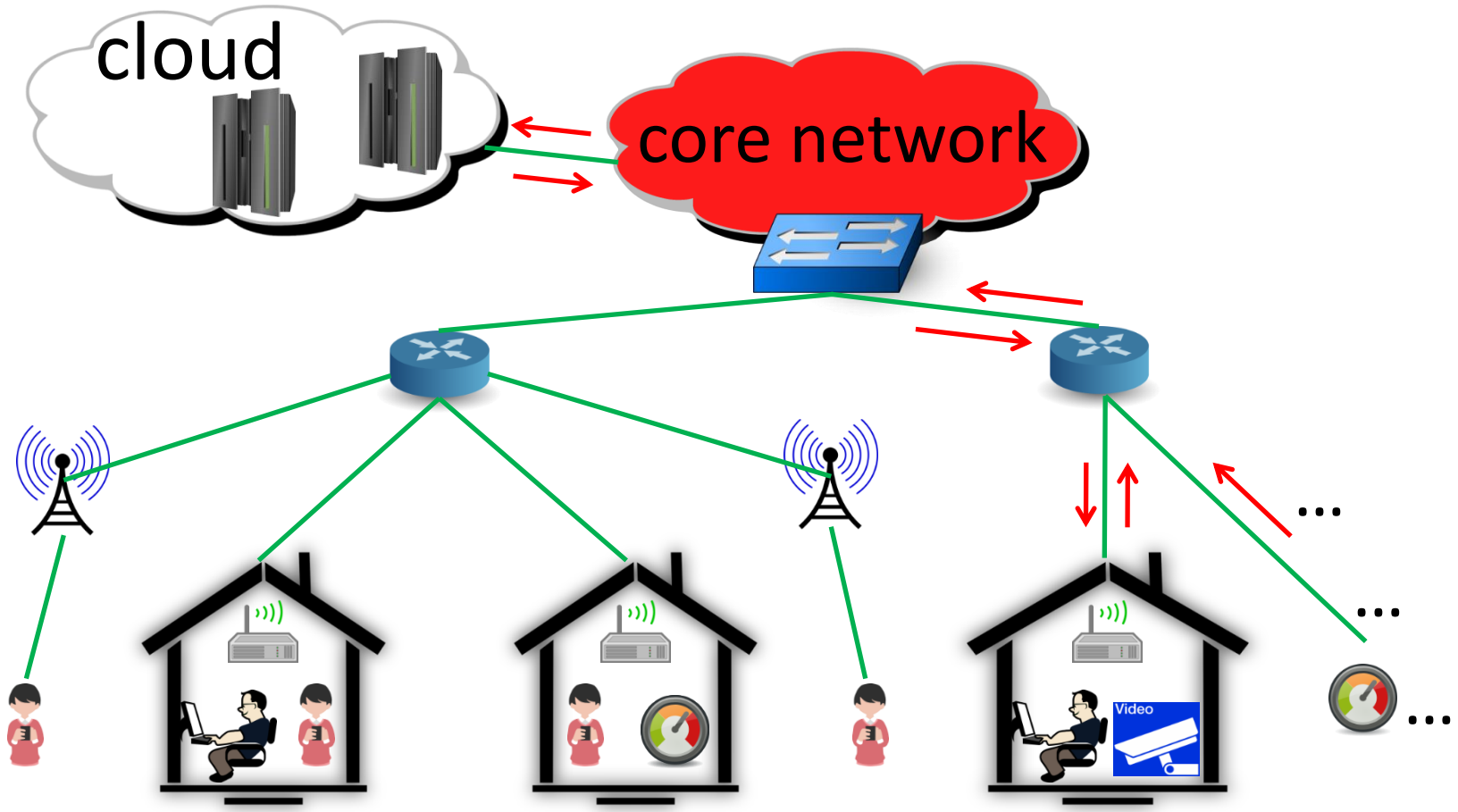
ASF Winter School 2017

This talk contains material from François-Gaël OTTOGALLI , Pascal DECHAMBOUX from Orange Labs

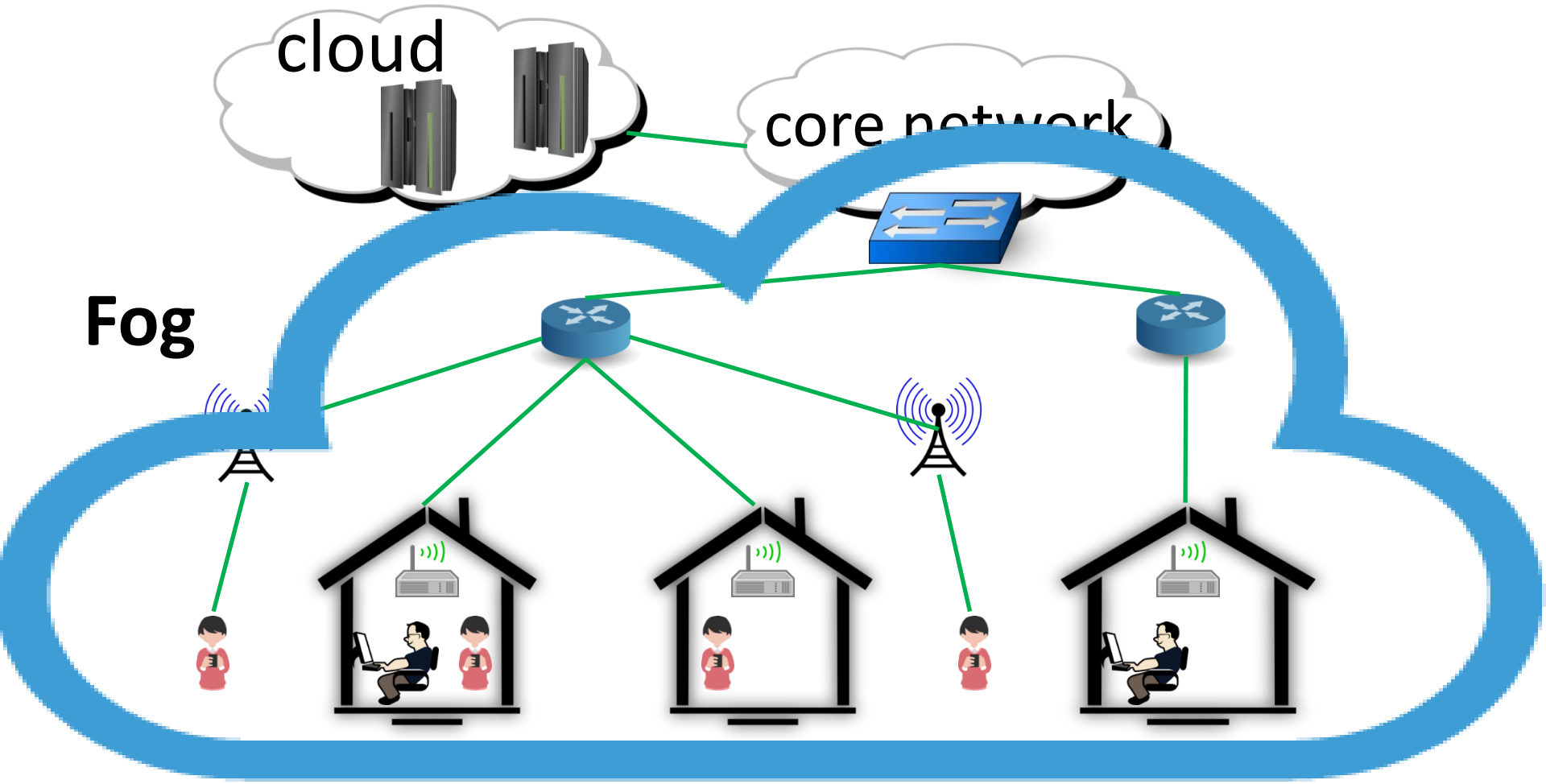
Outline

Outline

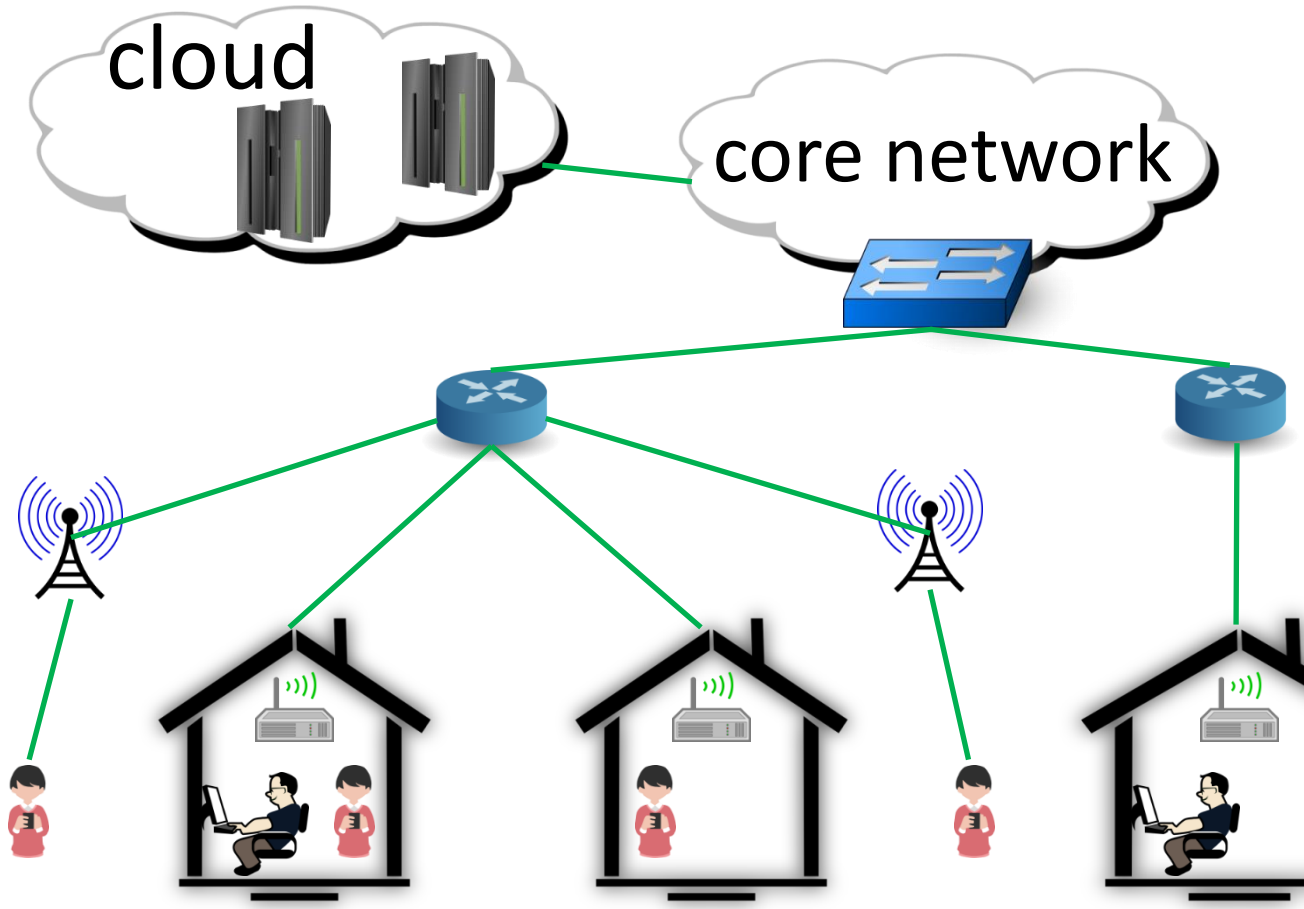
Context - Cloud Computing



Context - Fog Computing



Context - Fog-Cloud Computing

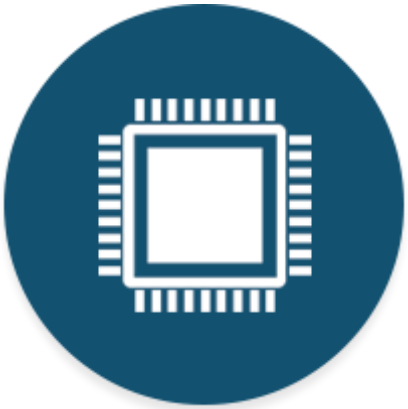


homogeneous
stable
capable

reactive

Outline

Model

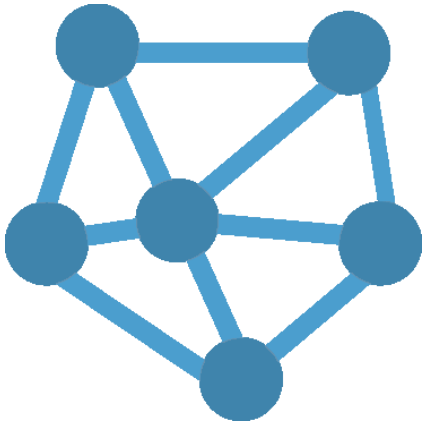


Compute

CPU (FLOPS)
RAM

Storage

DISK

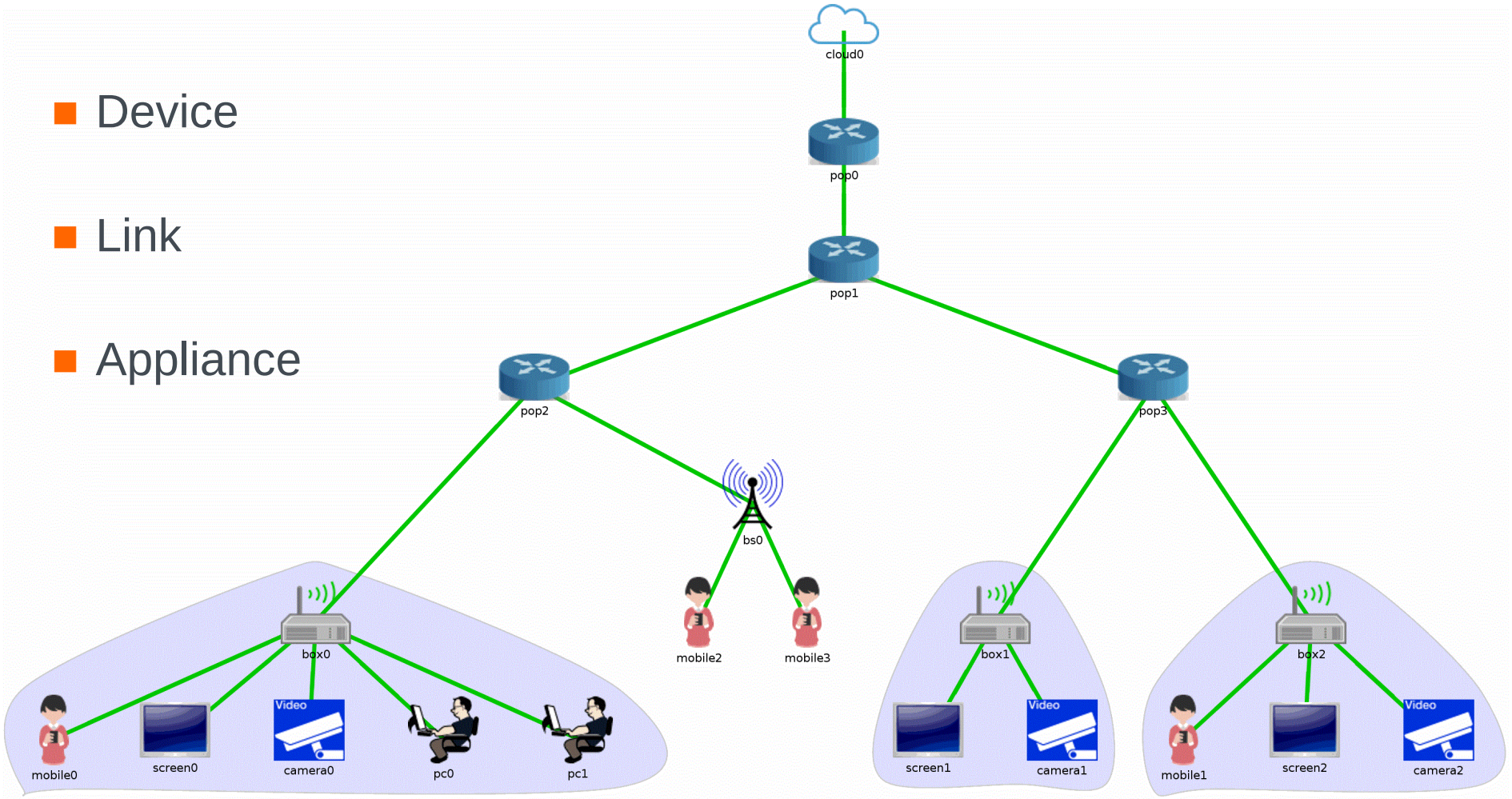


Network

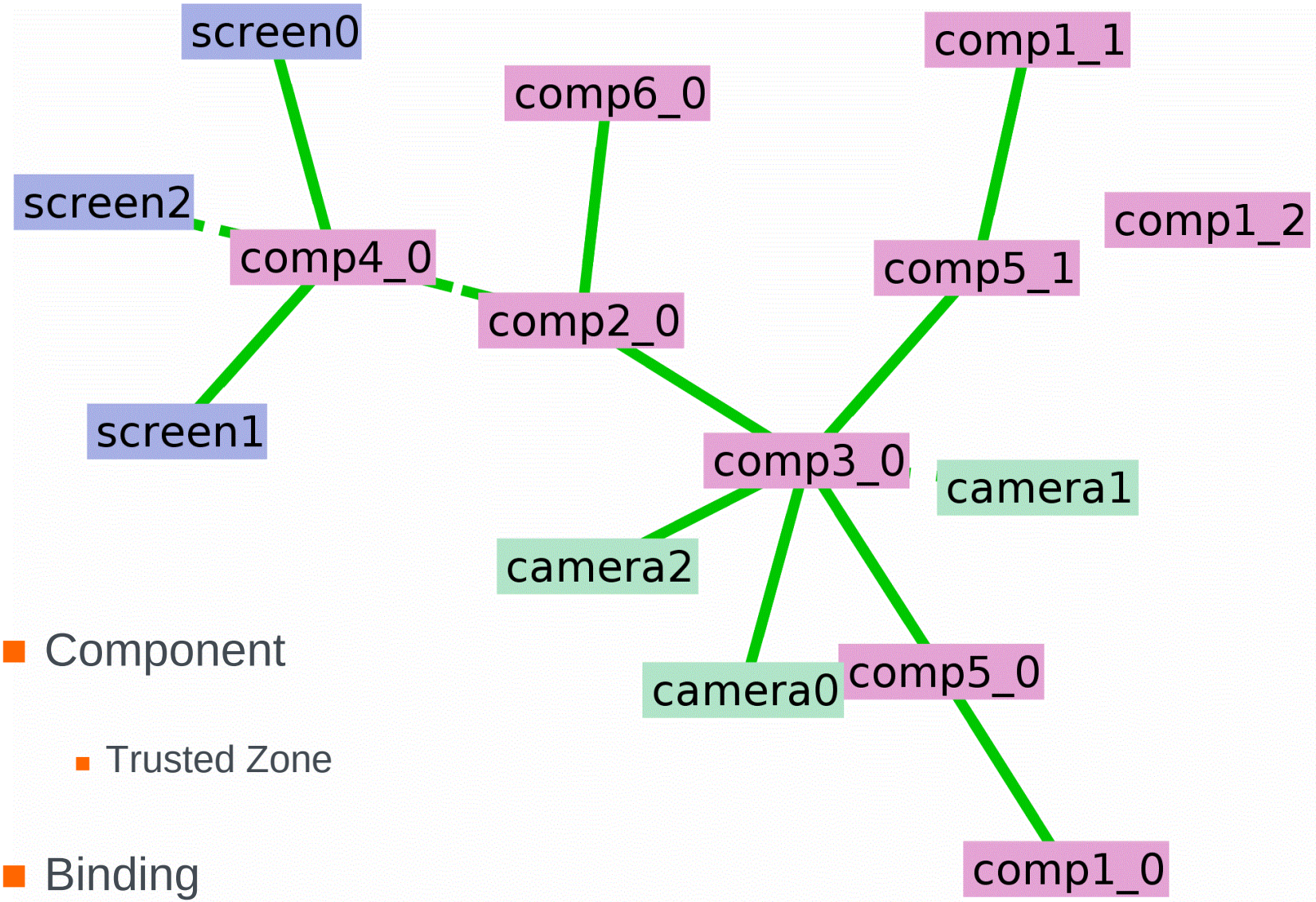
Latency
Bandwidth

Model - Infrastructure Model

- Device
- Link
- Appliance



Model - Application Model



- Component
  - Trusted Zone
- Binding

Outline

Placement - Constraints

Placement Constraint

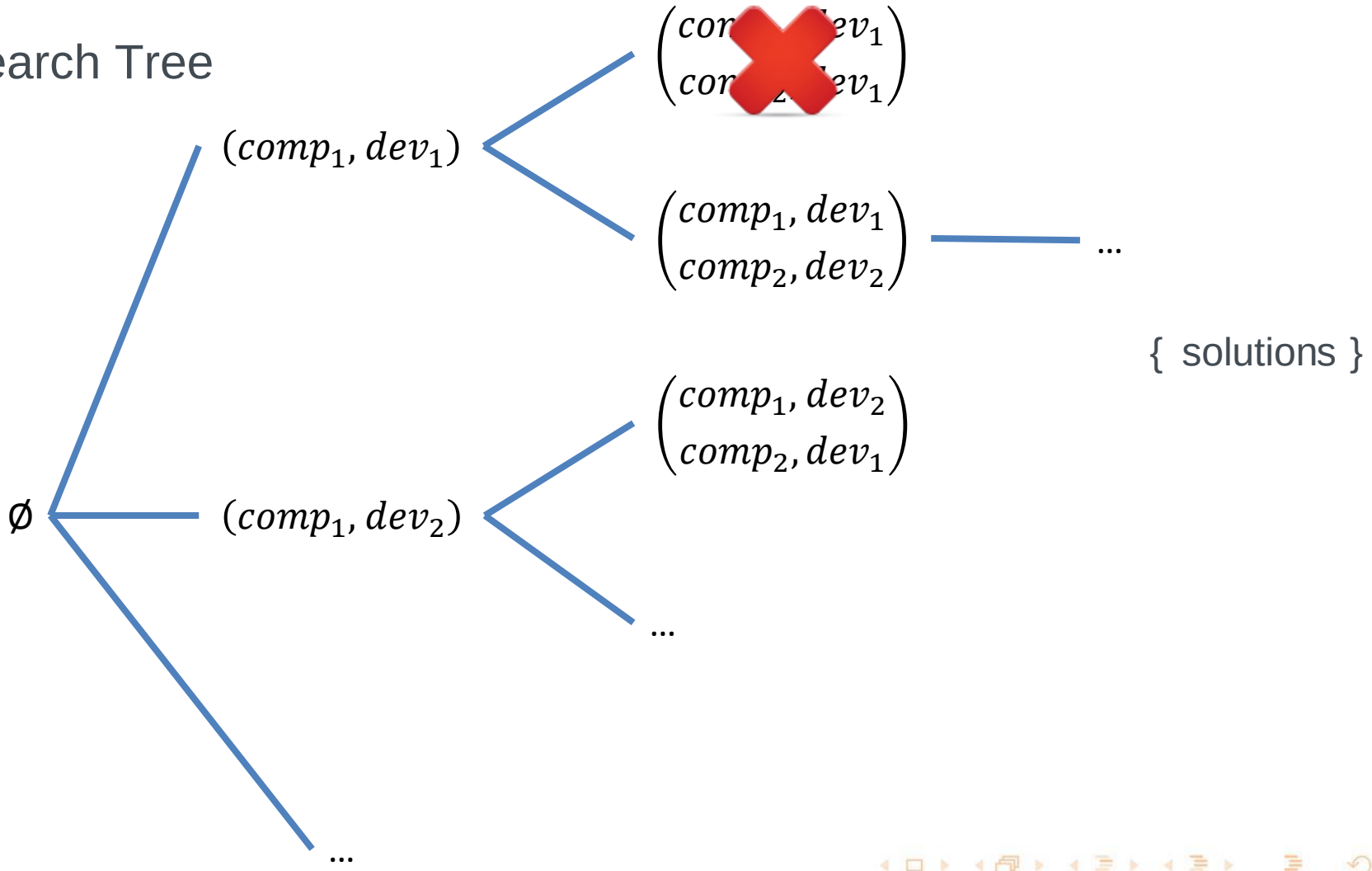
- Each component is placed in a device

Solution Constraint

- Consumption of Compute & Storage Resource
- Consumption of Bandwidth
- Latency
- Trusted Zone

Placement - Solution Search

- Backtracking algorithm
- Search Tree



Placement - Solution Selection

weighted average latency

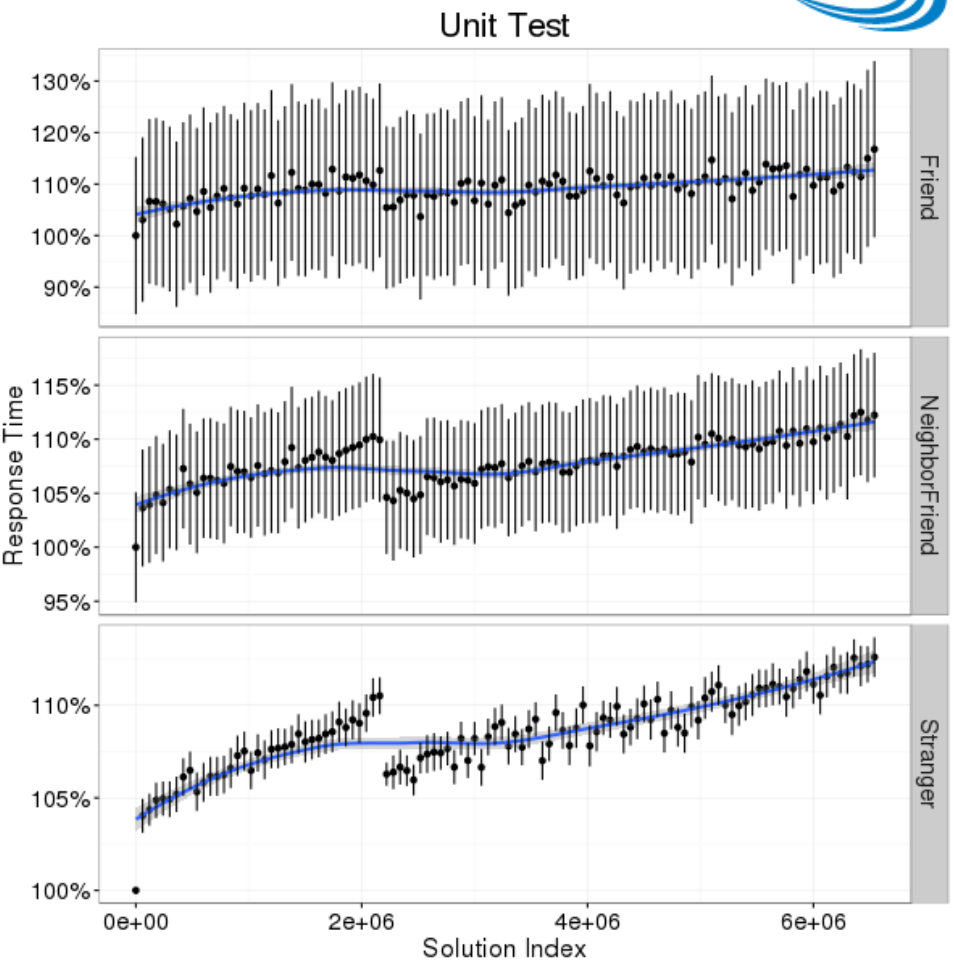
weight : $\frac{bw(bind)}{bw(app)}$

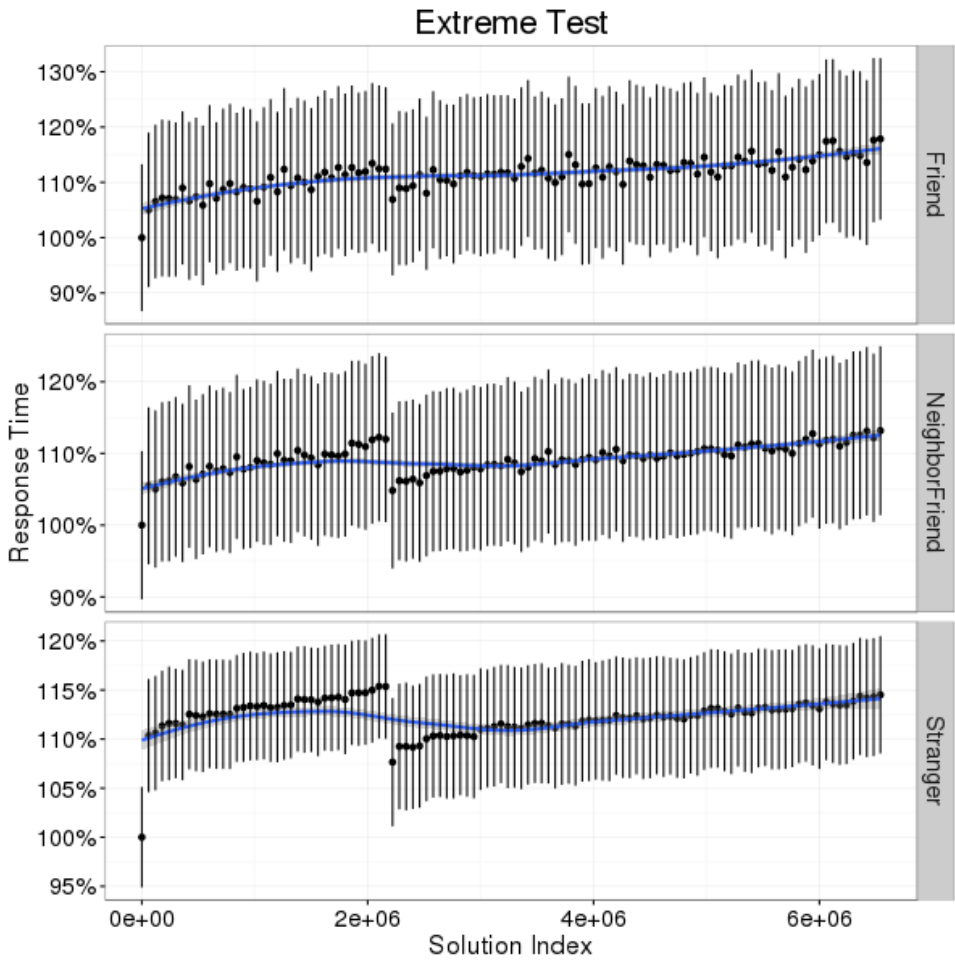
$$w\_avg\_lat(app) = \sum_{bind} \left(lat(bind) * \frac{bw(bind)}{bw(app)} \right)$$

$$minimize : \sum_{app} w\_avg\_lat(app)$$

Outline

Evaluation


Unit Test
Response Time
Solution Index
Friend
NeighborFriend
Stranger
130%
120%
110%
100%
90%
115%
105%
95%
0e+00
2e+06
4e+06
6e+06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Outline

Future Work

Algorithm Acceleration

- Heuristics

Evaluation

- Small scale experiment
- Large scale simulation

Thanks for your attention