

Deploy SDN-IP

#ONOSProject

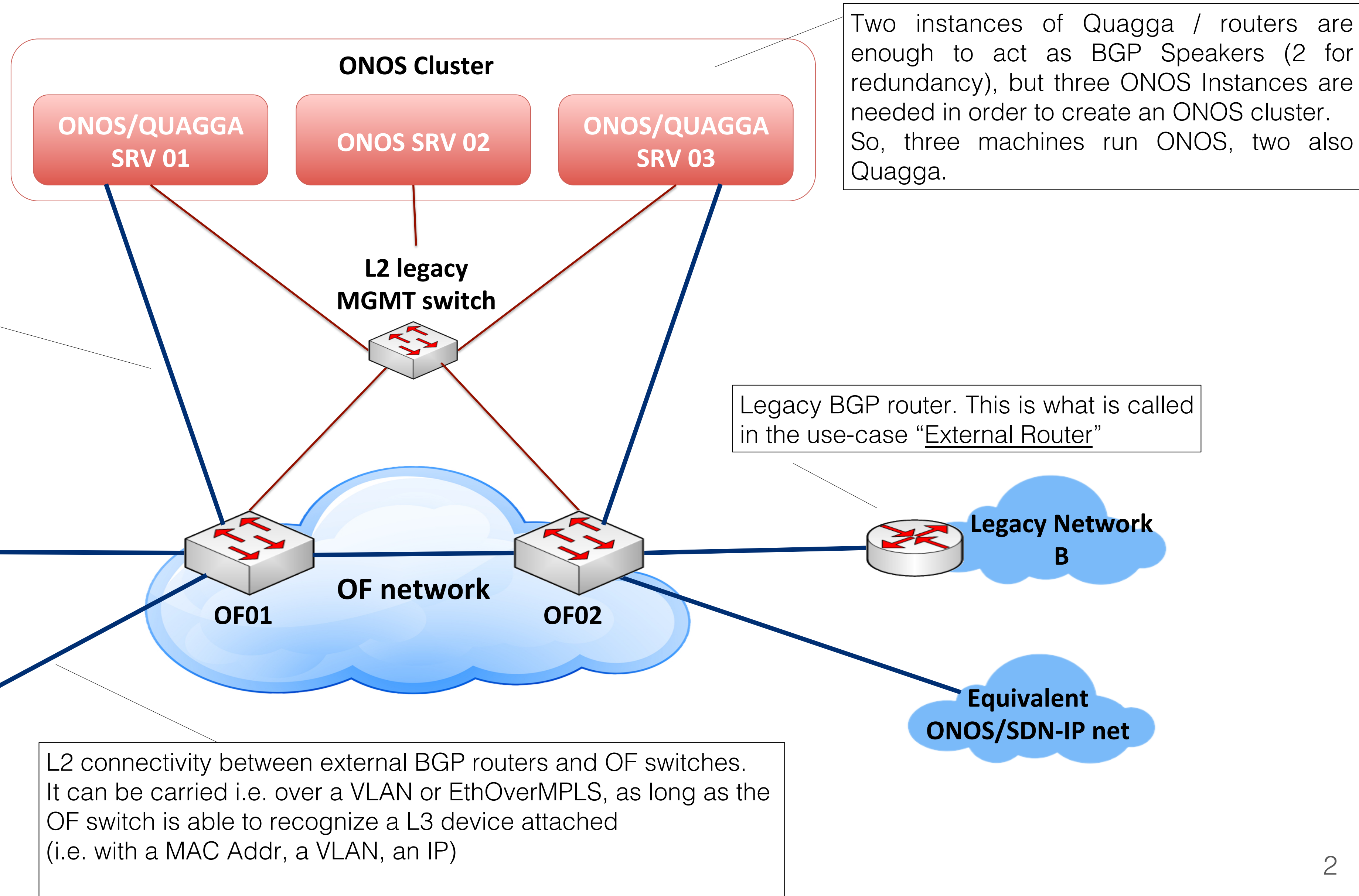


Physical setup

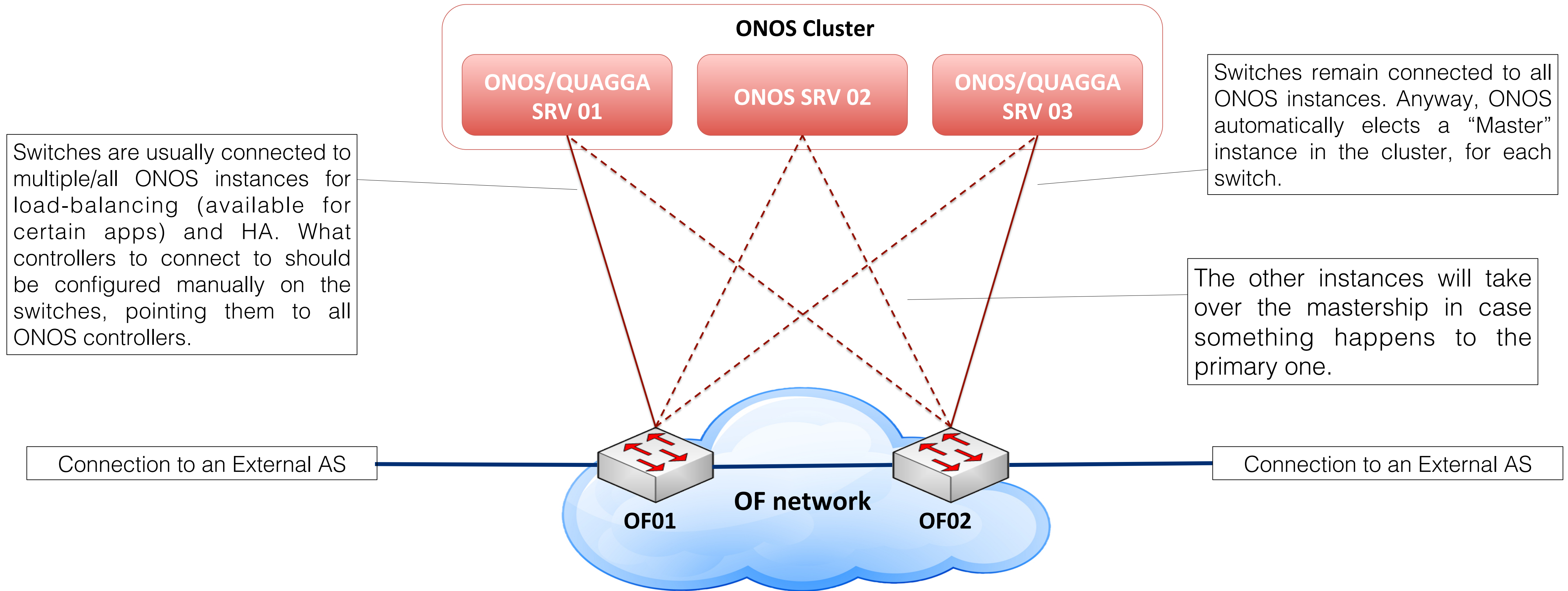


— Data plane network
— Control plane network

Each ONOS+Quagga instance has two NICs: one for oob and communicate with the OpenFlow controller (control plane) and another one plugged somewhere into the dataplane. As for the external routers (see below) this can be any L2 connection, as long as ONOS will be able to recognize the server as an host (i.e. with a MAC Addr, a VLAN, an IP).



OpenFlow Control Plane Connectivity



ONOS / Quagga Servers – detailed view



Minimum Requirements:

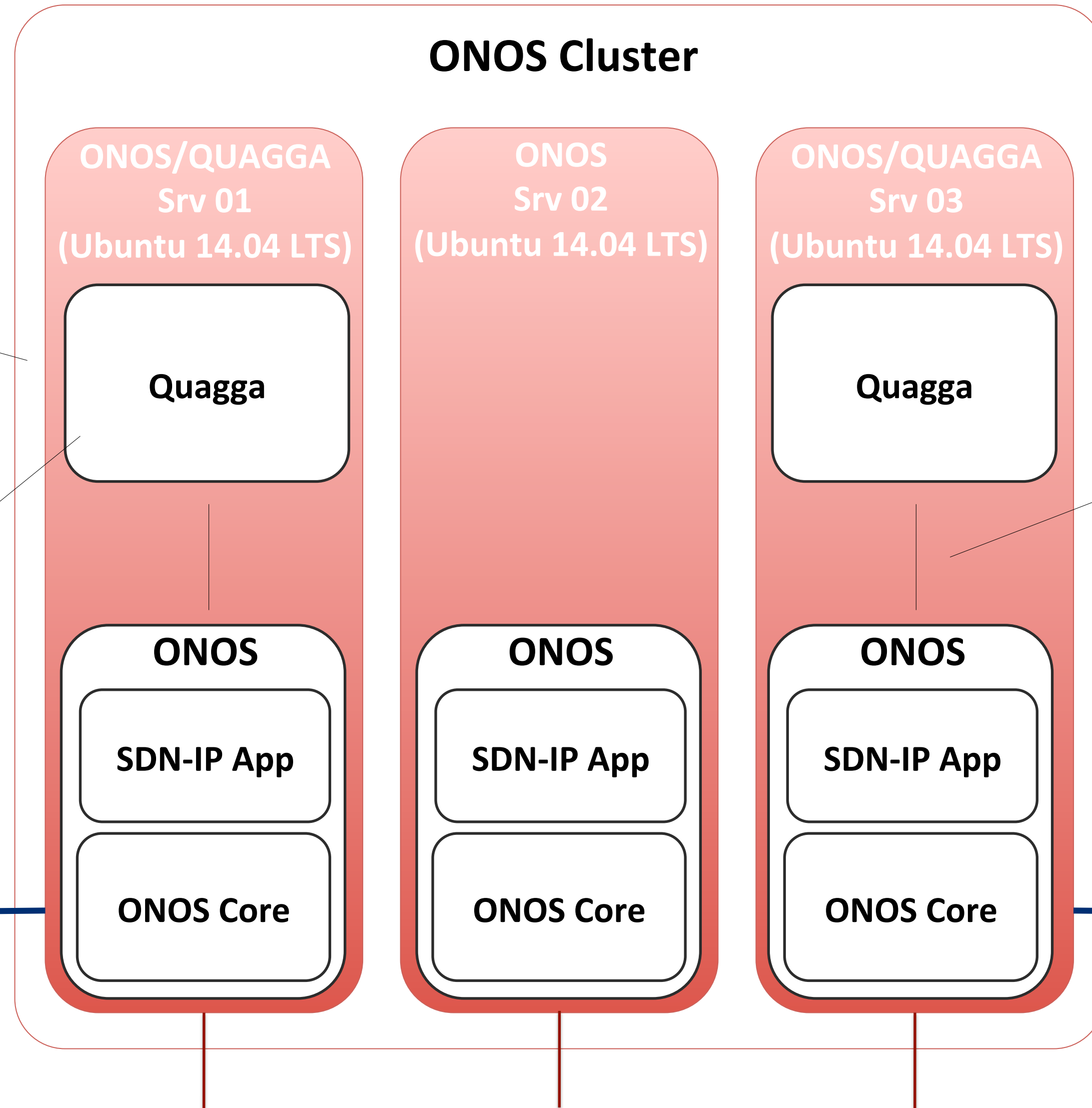
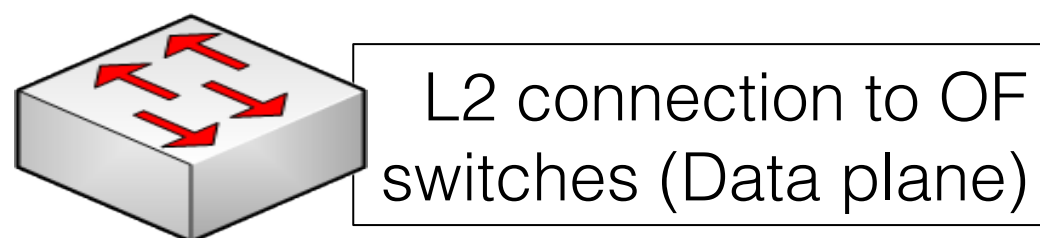
- 2 Cores
- 2G RAM
- 20G Disk

Suggested Configuration:

- 4 Cores
- 4G RAM
- 50G Disk

Final servers requirements depend by the machine load (# routes? # intents? # apps?)

This is what in the use-case we call "BGP Speaker"



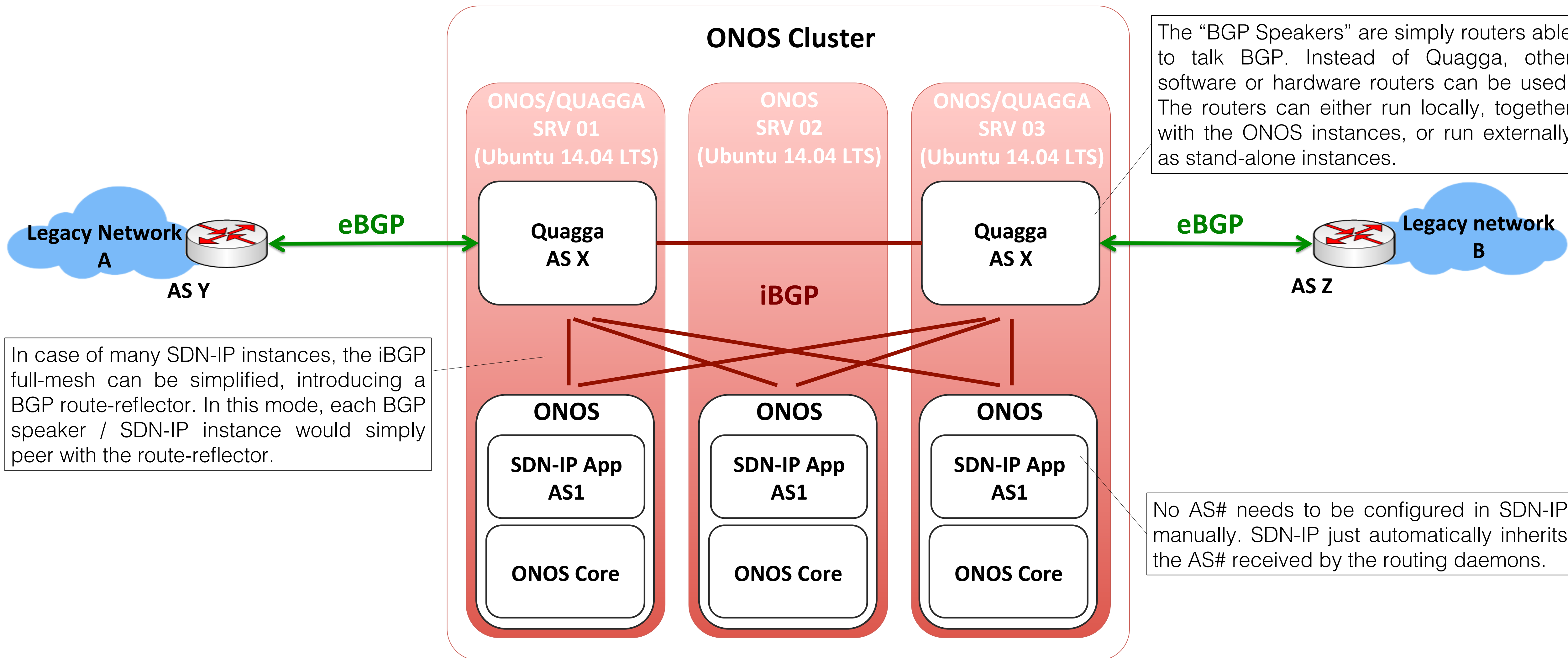
If the routing daemon (i.e. Quagga) and ONOS live on the same machine, they communicate through the loopback interface. As soon as it becomes active, SDN-IP opens by default the port TCP 2000, waiting for incoming BGP connections.

ALL machines (even if not running the routing daemon) need to have port 2000 reachable from the other ONOS instances and from other routing daemons (regardless if they sit or not on the same machine), through the management network, since these components all need to peer together (iBGP).



L3 Connectivity to OF switches through the L2 legacy MGMT switch

Layer 3 Topology and BGP

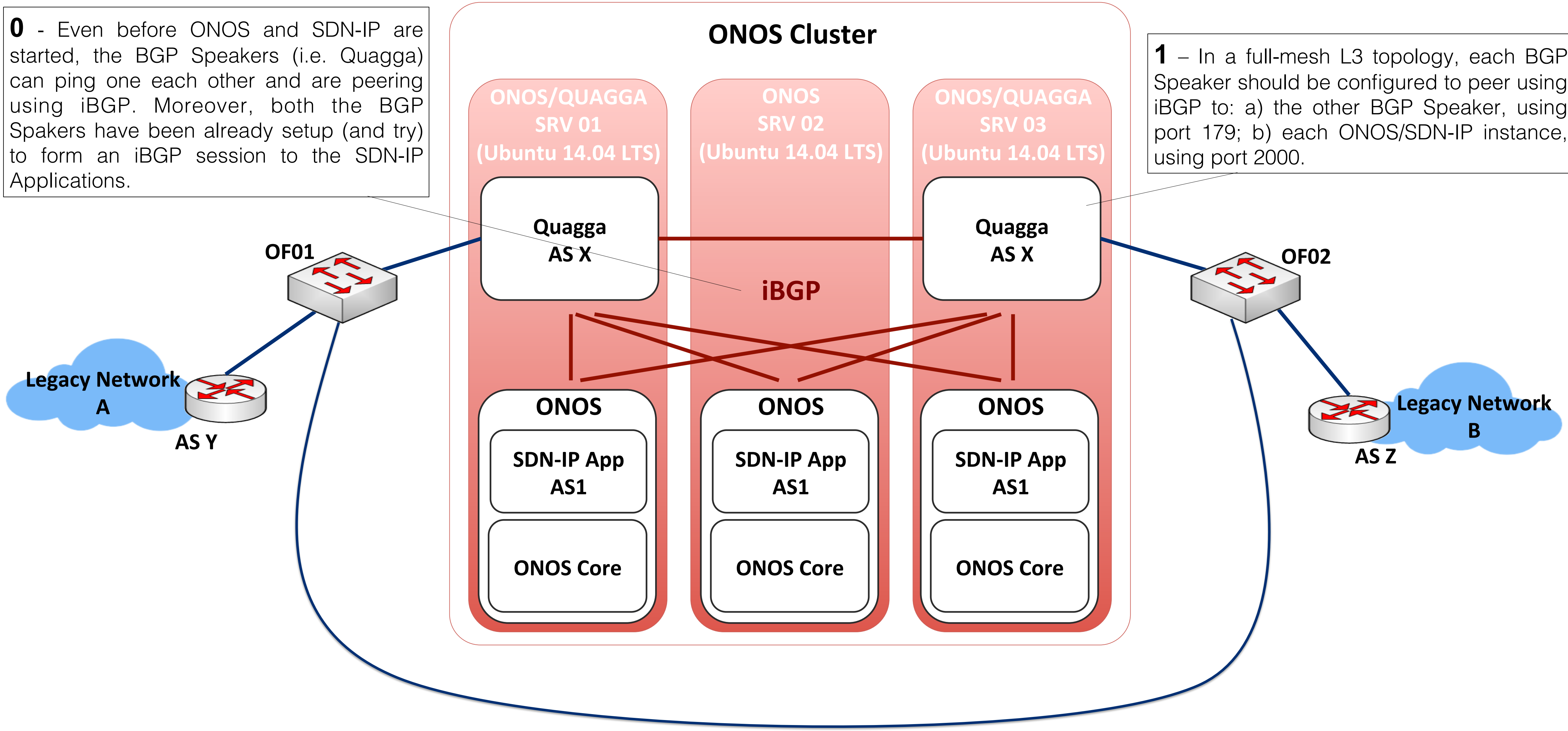


Basic Workflow 1/3 (pre-existing iBGP Session)



0 - Even before ONOS and SDN-IP are started, the BGP Speakers (i.e. Quagga) can ping one each other and are peering using iBGP. Moreover, both the BGP Spakers have been already setup (and try) to form an iBGP session to the SDN-IP Applications.

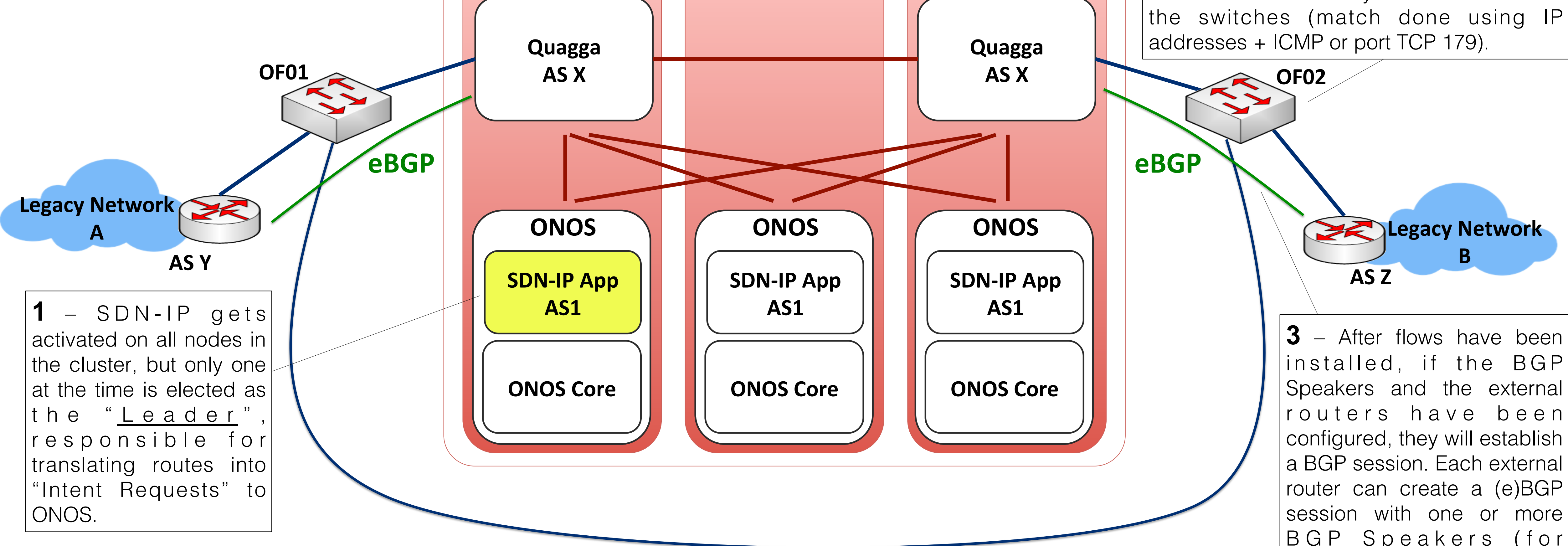
1 - In a full-mesh L3 topology, each BGP Speaker should be configured to peer using iBGP to: a) the other BGP Speaker, using port 179; b) each ONOS/SDN-IP instance, using port 2000.



Basic Workflow 2/3 (eBGP Session Establishment)



0 - With a configuration file (or through CLI) the admin expresses a) the attachment points where both the BGP Speakers and the routers are attached; b) what BGP Speaker is in charge of peering with a certain external router.



2 - SDN-IP parses the configurations and it creates accordingly “Point to Point Intents” (request of connectivity with certain constraints between two points in the network) to put in communication the external routers with the BGP Speakers at L3. This is translated by ONOS into flows on the switches (match done using IP addresses + ICMP or port TCP 179).

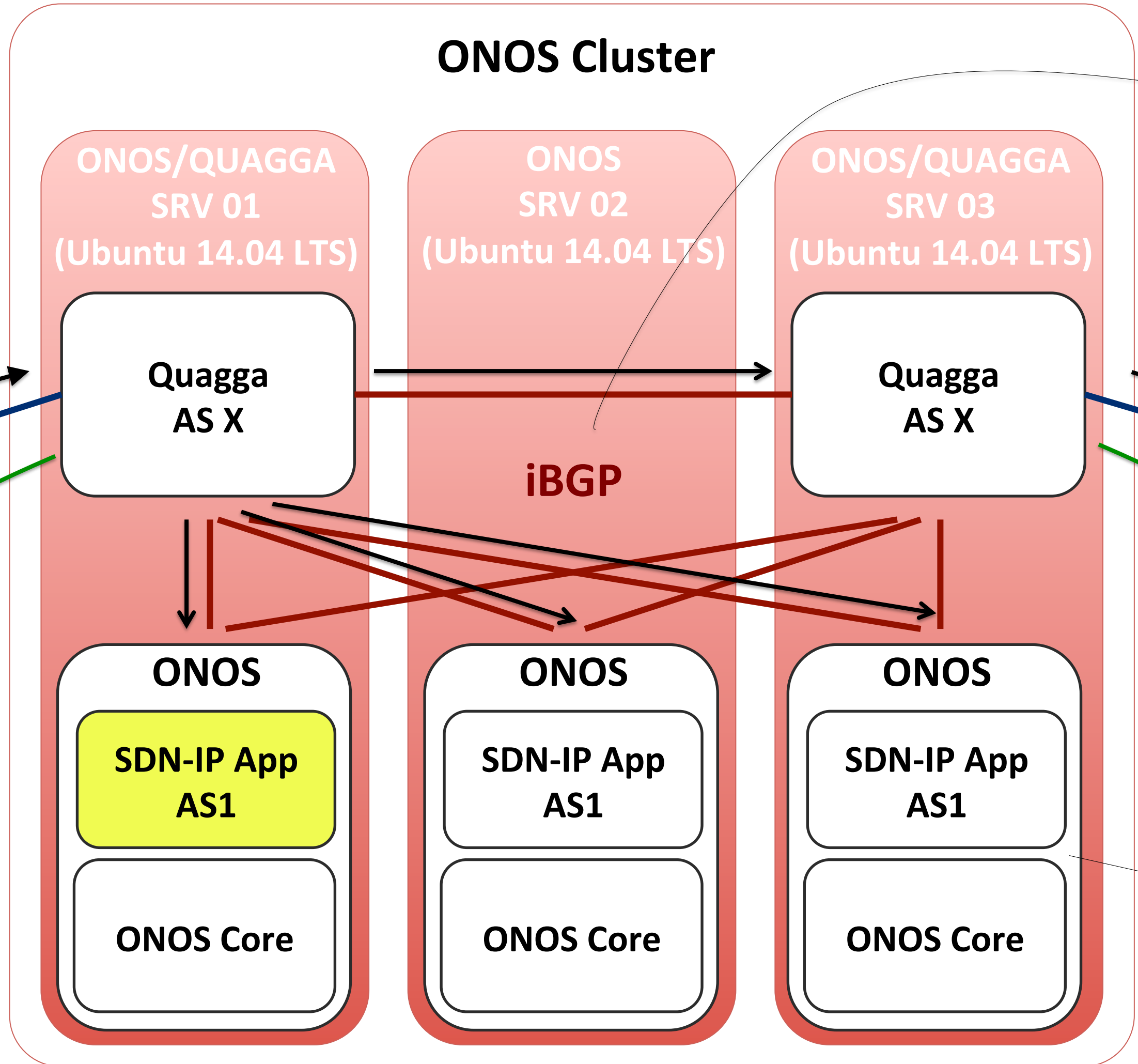
1 - SDN-IP gets activated on all nodes in the cluster, but only one at the time is elected as the “Leader”, responsible for translating routes into “Intent Requests” to ONOS.

3 - After flows have been installed, if the BGP Speakers and the external routers have been configured, they will establish a BGP session. Each external router can create a (e)BGP session with one or more BGP Speakers (for redundancy).

Basic Workflow 3/3 (Propagation of Routes)



0 – Precondition: ONOS sees the external routers and the BGP Speakers connected to the OF devices, as hosts. SDN-IP started up and opened port 2000: all iBGP sessions are active through the Control Plane. After Point to Point Intents have been installed by SDN-IP so flows have been created on the OF switches, all eBGP sessions have been successfully established.



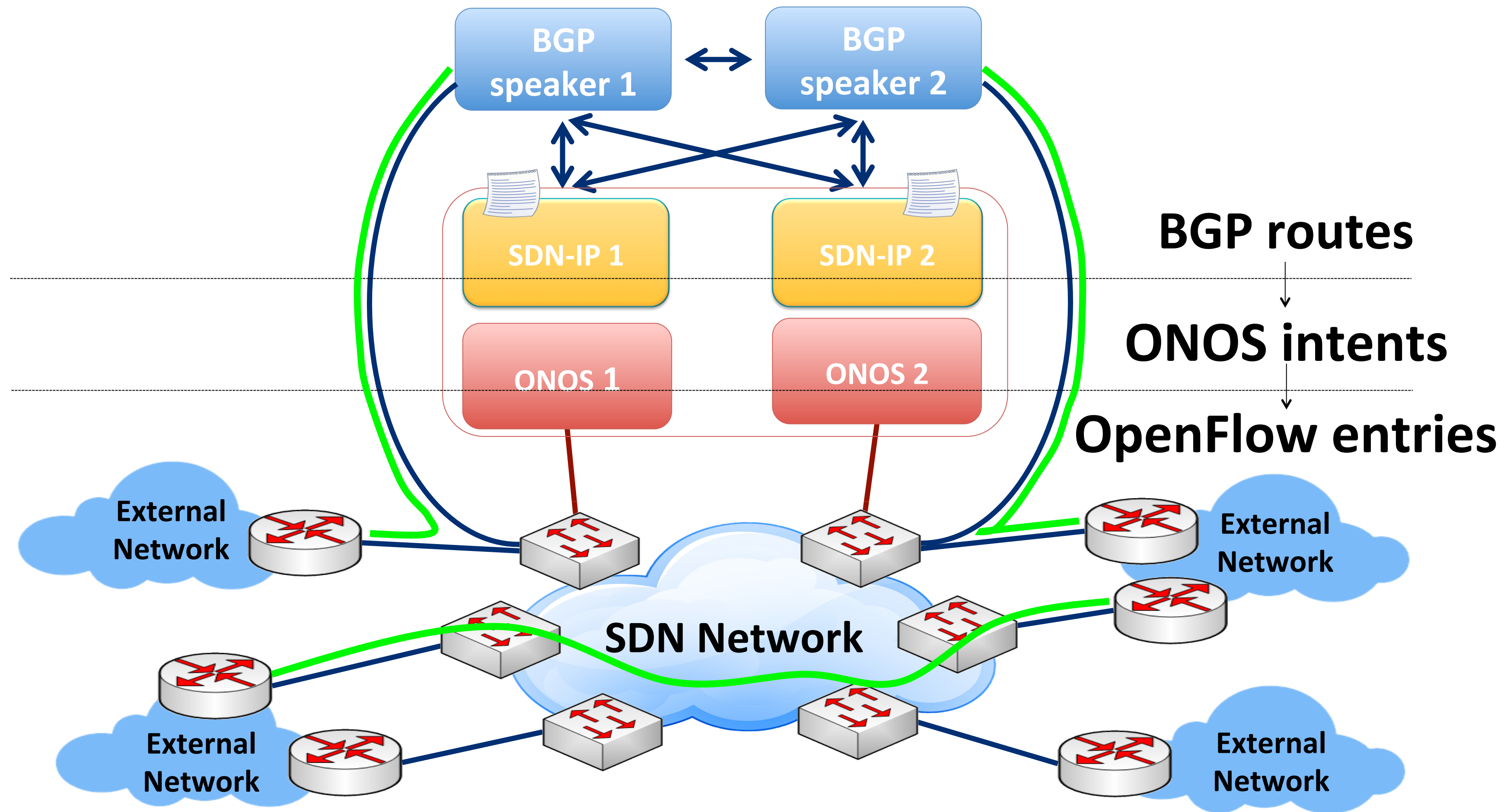
2 – Routes propagated through iBGP from the BGP Speaker to the other BGP Speaker and to the SDN-IP applications.

3 – Speakers advertise other external routers

1 – Routes get advertised from the external router to the BGP Speaker.

4 – SDN-IP translates routes into MultiPoint to SinglePoint Intents requests. ONOS translates Intent requests into OpenFlow entries on the switches.

5 – External routers now communicate directly through the OpenFlow dat plane.





- **ONOS Project:** <http://onosproject.org>
- **ONOS Wiki:** <http://wiki.onosproject.org>
- **SDN-IP Wiki Page:** <https://wiki.onosproject.org/display/ONOS/SDN-IP>