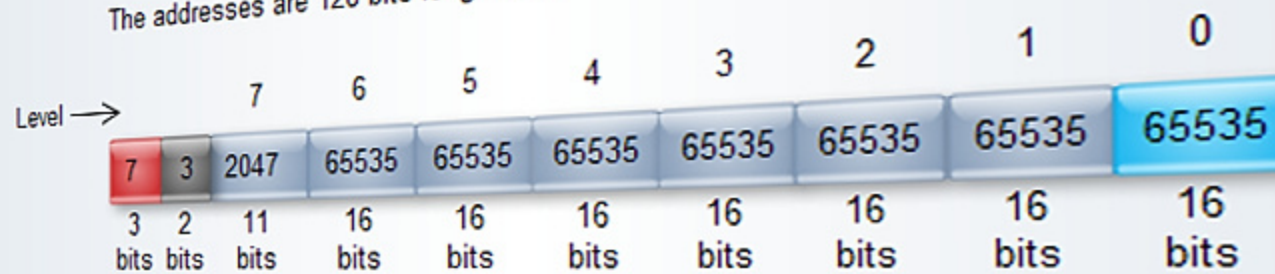




Address Structure

The addresses are 128 bits long and it is divided in to 8 levels

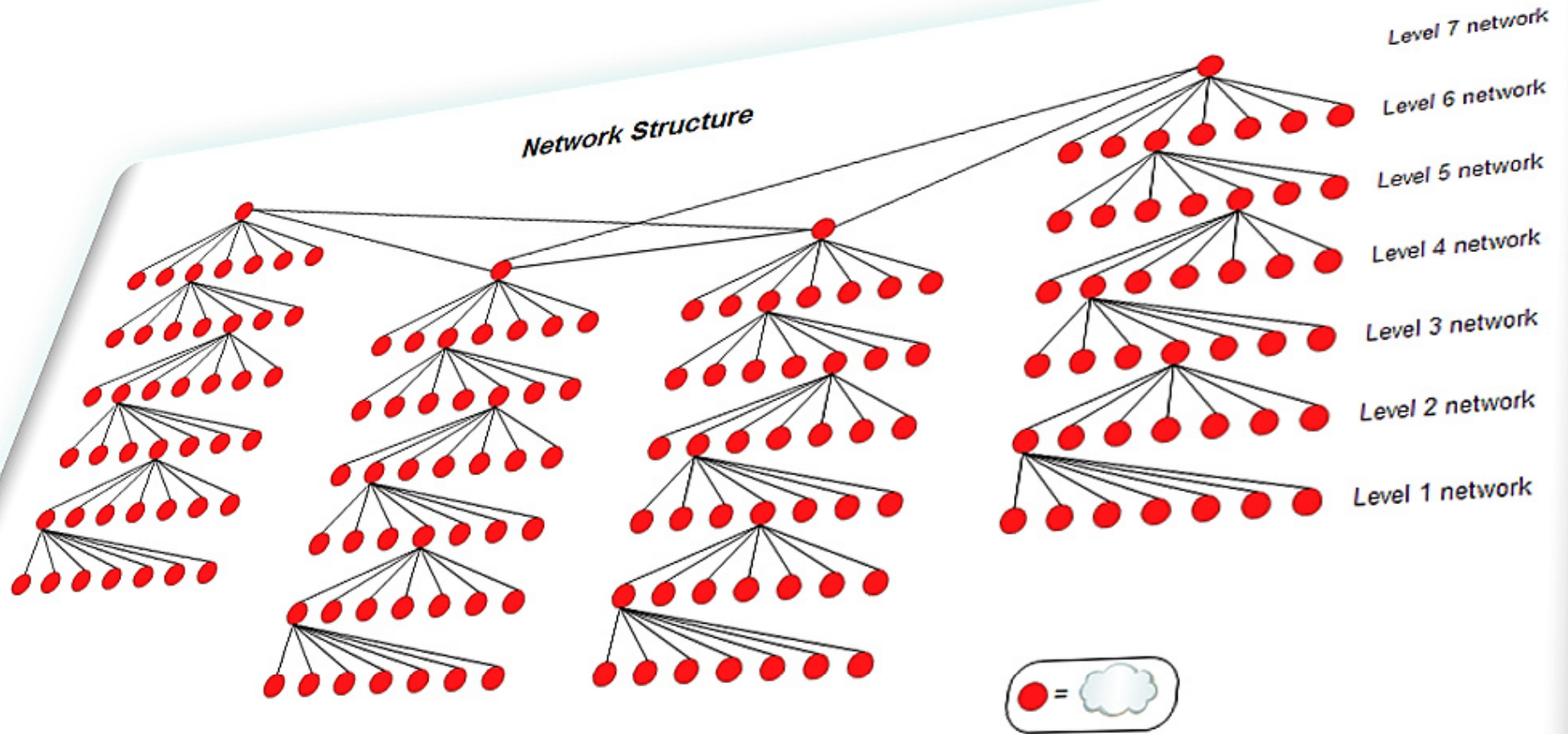


 3 bits to mark the level

 2 bits for multicast (flag bits)

Hosts address bits are represented by Level 0.
Network address bits are represented by Levels 1 through 7

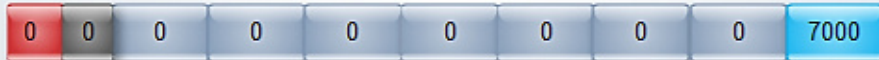
Network Structure



Assign IP address - Host

Need to configure only the host portion of the IP address.

For example:
7000



Identify the Globally unique address

All devices must query the top most router (bits are set to 1 in the level field) to find its unique global IP address.

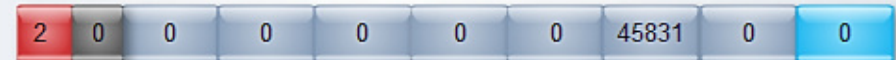
when a query arrives at the incoming interface, router should append its network address to the query packet. The top most router (the one has no upstream interface) will replay to that query. The replay packet should include the unique IP address.

If a router has a unique address (queried earlier), it can replay for that query.

Assign IP address - Router

Routers must set its level and network address.

For example: L2 45831



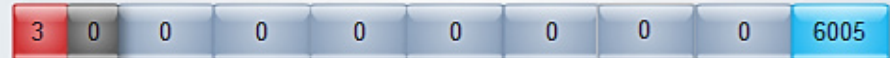
where L2 is the level of the router and 45831 is the network.

Interfaces are categorized in to 3 according to the connected neighbor.

The **interface level field** describes the level of the connected network.

UPSTREAM interfaces: connected to a higher level network

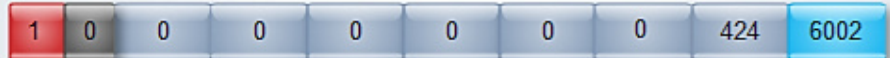
address configuration: 6005 L3



The interface address is 6005 and it is connected to a level 3 network

DOWNSTREAM interfaces: connected to a lower level network

address configuration: 6002 L1 424



The interface address is 6002 and it is connected to a level 1 network 424

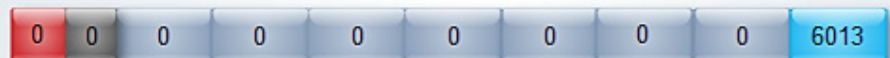
SAME LEVEL interfaces : connected to a same level router

address configuration: 6006 L2

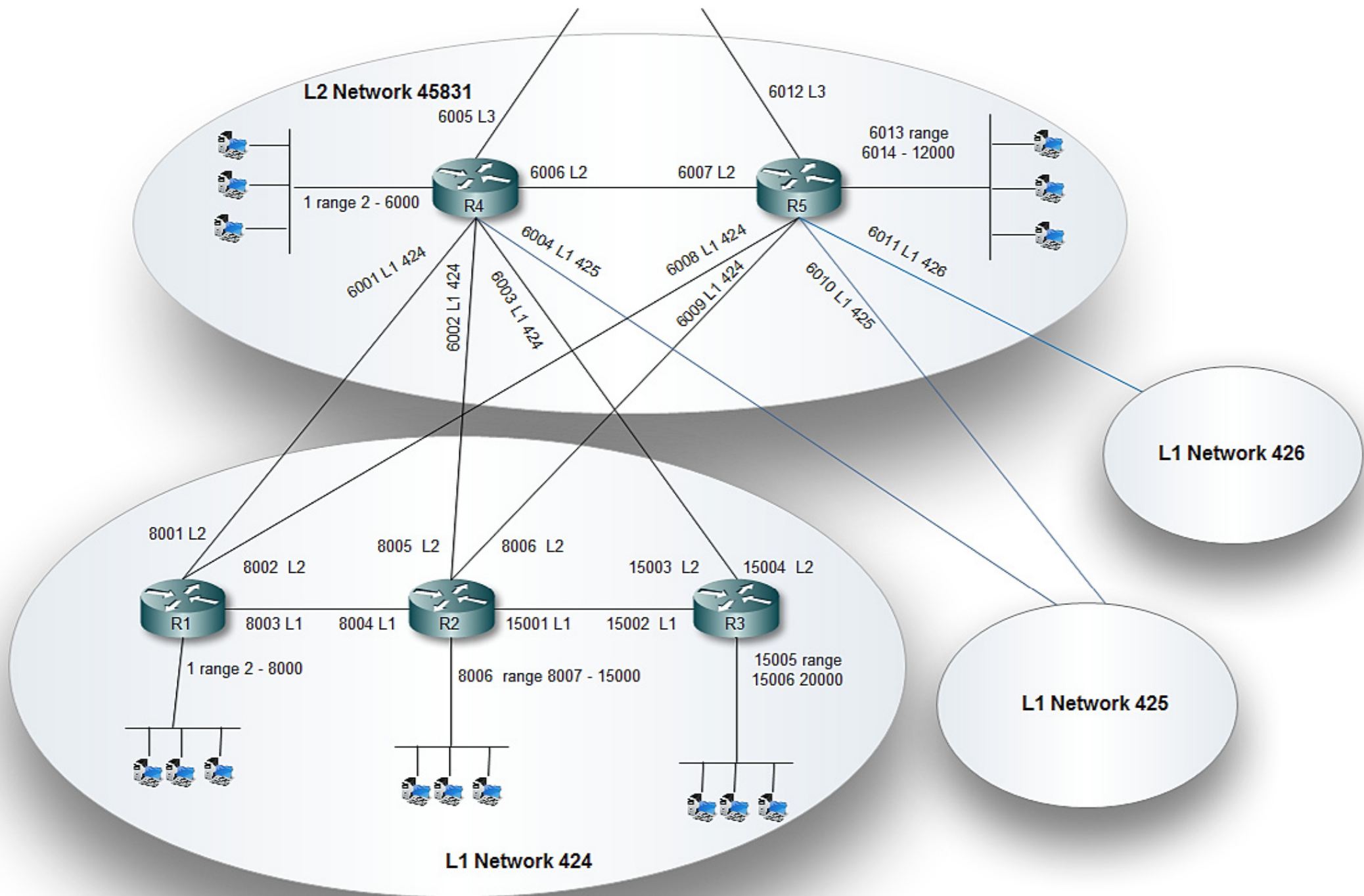


SAME LEVEL interfaces : connected to a same level host(s)

address configuration: 6013 range 6014 - 12000



The "range" keyword indicates that the host addresses 6014 to 12000 are accessible through this interface. No need to configure the level



Routing

Functions of a Host

1. Request Globally unique destination address from the DNS
2. Trim off the unwanted top level information

Host should compare its unique address with the unique destination address. Reset the level information, and send the packet to the destination.

Example:



Functions of a router

Same level routers exchange routing information.

Routing logic

check the level of ip address

if greater than router level - simply forward the packet to upstream router.

if same as router level check network address

if different - forward it towards the destination

else check downstream network

if downstream network is present

(if the downstream network is under another router, then forward the packet to neighbor router)

decrement destination level and then forward packet.

else forward the packet to the same level neighbor router or to the host

Note: in routing logic a 0 in the downstream network field is equal to no downstream network.

IP address 10.4000.1486.2.200.45831.0:6015 is a level 2 host address

Routing Table

The routes are classified in to 4

- Upstream routes
- Host routes
- Downstream networks
- Same level networks // only in top level routers

65471 host entries ,65535 downstream networks 2047 same level networks and Upstream routes

Every entry should have best/equalcost exist(s) .

The routing table size is limited to 133053 routes.

Individual entries permits direct access and it will increase the performance.

Example

Upstream routes

Upstream Level	Exit interface
L3	Interface xx
	Interface xx

Same level routes

Same level Network	Exit interface
1	Interface xx
2	Interface xx
	Interface xx
3	
2047	Interface xx

Host routes

Host address	Exit interface
1	Interface xx
2	Interface xx
	Interface xx
3	Interface xx
4	Interface xx
5	Interface xx
	Interface xx
6	Interface xx
65471	Interface xx

Downstream routes

Downstream Network	Exit interface
1	Interface xx
2	Interface xx
	Interface xx
3	Interface xx
4	Interface xx
5	Interface xx
	Interface xx
6	Interface xx
65535	Interface xx


} equal cost exits

Multicast

The idea is to request multicast feed directly from the source. Reserve some level 0 host address range for multicast.

For example: 1111111111000000
Range 65472 - 65534



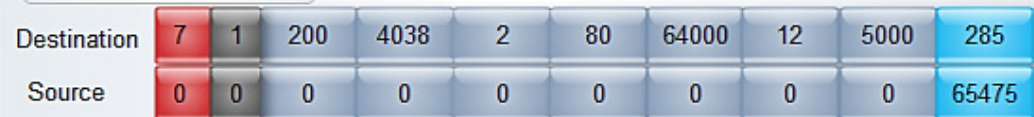
 2 bits are reserved (multicast flag bits)

Request Multicast feed

Set the multicast flag bits to 01 (binary) and send request towards the multicast source ; if this is the first request, router will forward the request to the next router towards the multicast source. For all subsequent requests for this unique multicast source, router will keep track of those requests in a table. no need to forward request. Repeat the process in each level.

In the multicast **request packet**, the source address has no importance. Hence, we can attach the expected multicast destination address as the source address, as a level 0 address.

Multicast Request



The host is requesting multicast feed from 200.4038.2.80.64000.12.5000:285 and the destination address should be 65475

Build a request table using this information.

Multicast Source address	Destination address	Requested interfaces
200.4038.2.80.64000.12.5000:285	65475	Interface xx
		Interface xx
		Interface xx

Multicast feed

Set the flag bits to 11 for the multicast feed. (optional , we can identify multicast packet by the destination address)
check the source and destination then replicate the feed to all requested interfaces.

Cancel multicast request

Set the flag bits to 10 (in binary): Host will send a cancellation request towards the destination. if this is the last request, then the router will forward the request to the next level.else cancel the request from the request table.