IGMP Snooping

Mario Baldi
Politecnico di Torino
mario.baldi[at]polito.it
staff.polito.it/mario.baldi

Pietro Nicoletti
Studio Reti
piero[at]studioreti.it
www.studioreti.it

Based on chapter 8 of:
M. Baldi, P. Nicoletti, "Switched LAN", McGraw-Hill, 2002, ISBN 88-386-3426-2

Copyright notice

Traditional multicast transmission

Flooding

- Forward on every interface but receiving one
- Multicast traffic not bounded $\rightarrow$ no scalability

Alternative:

Knowing member's dislocation for each group

GMRP: GARP Multicast Registration Protocol

- GARP instantiation (Generic Attribute Registration Protocol)
- Defined in IEEE 802.1D
- Allow
  - Station to communicate their membership group to the switch.
  - Switch to communicate to adjacent switches from which group they must collect frames.

Same problems of multicast IP!!!

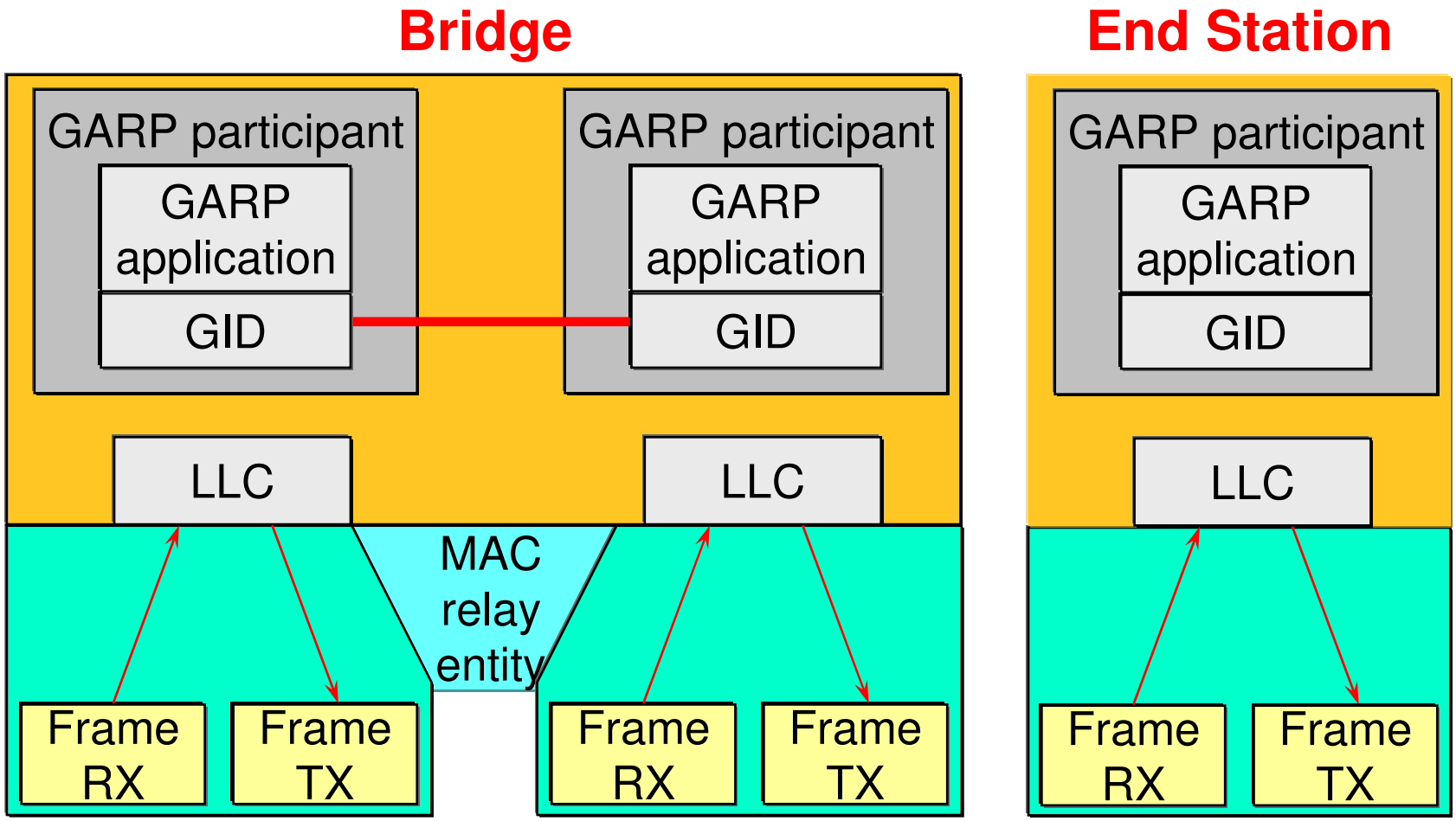
Resolved by

- IGMP (Internet Group Management Protocol)
- Multicast routing protocols

GARP: details

- Insert or delete miscellaneous attributs in equipments' internal entity called GID
  - GID (GARP Information Distribution) is a finite state machine which define the registration and declaration current state for each attribute's value
  - Attribute's registration or deletion takes place only in the port receiving the GARP PDU helding the declaration
    - Registration can take place in the ports that STP has Blocked
- GIP (GARP Information Propagation)
  - Entity responsible for information propagation between GARP Participant
    - internally in single bridge
    - between different bridge (based on type 1 LLC)

GARP: entities and architecture



IGMP Snooping: prelude

- GMRP barely used
  - Defined years ago, supported by most of switches
  - Why should we complicate network operativeness and management with an additional protocol?
- It's preferred to use existent protocols: IGMP

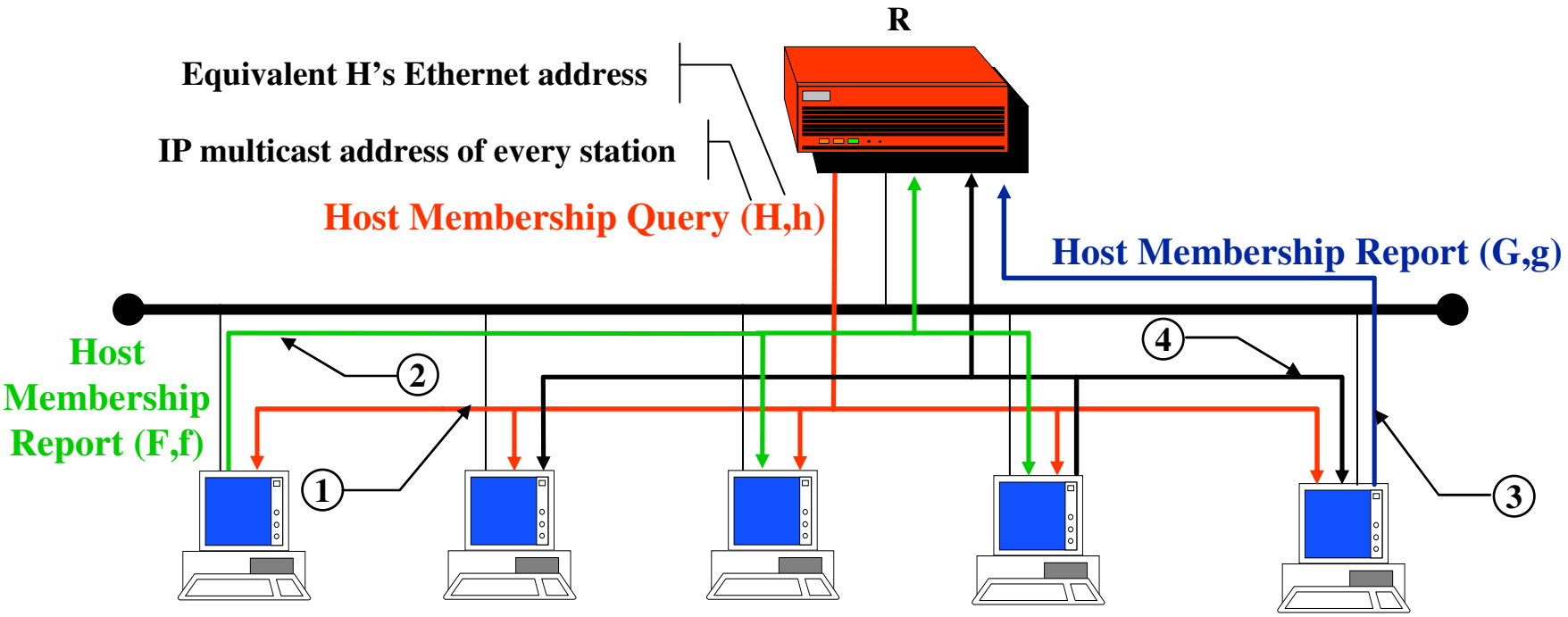
Assumption:

Level 2 multicast frame exchange is used nearly exclusively to send multicast IP packets

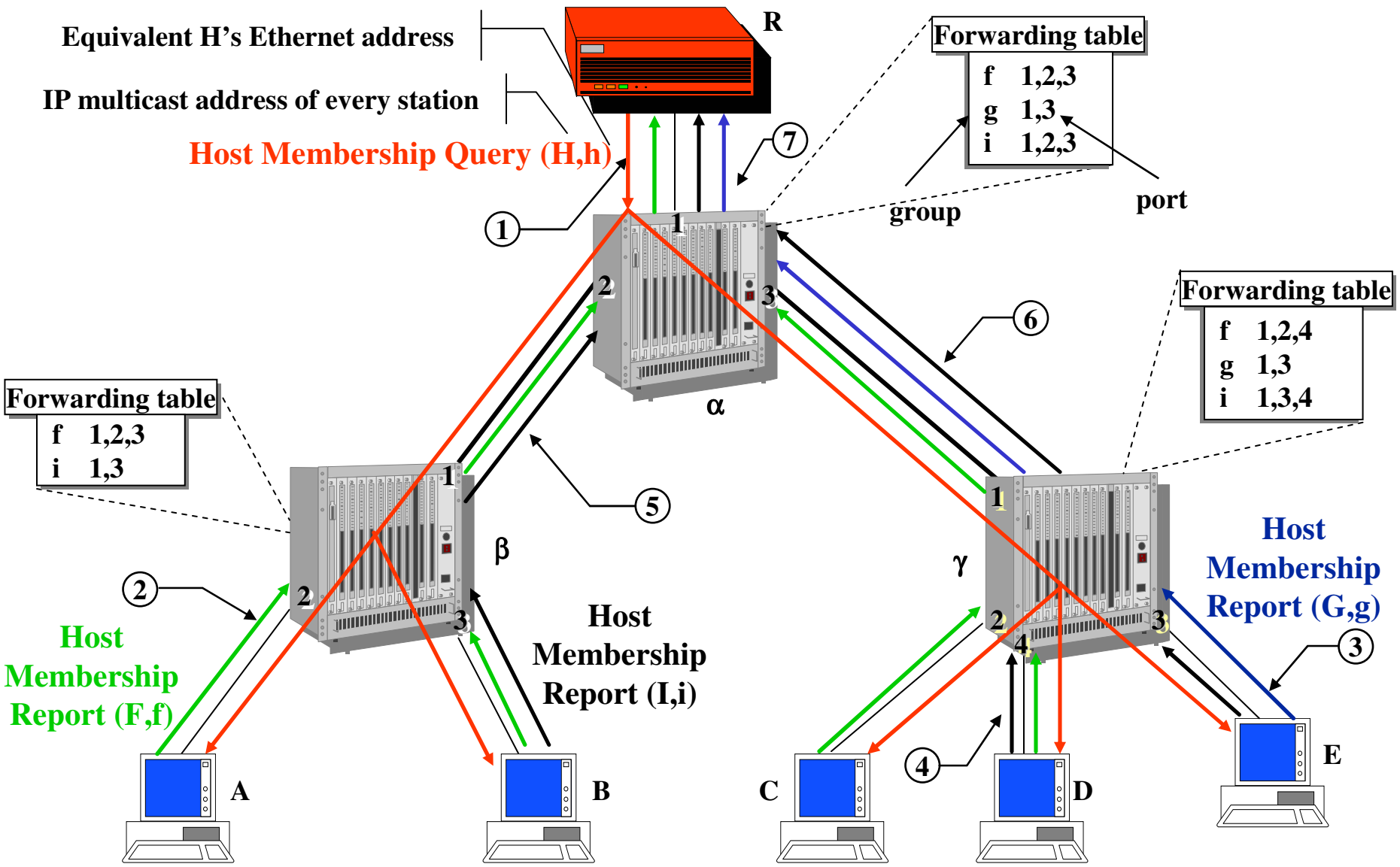
IGMP Snooping: mechanics

- Sending and receiving multicast packet must be preceded by the *registration* to the group identified by its IP address *G*
  - Send IGMP **`host membership report`** message
  - Transmitted in level 2 multicast frame addressed to multicast MAC *g* of *G* IP address
- Switches snoop **`host membership report`** messages
  - Learn on which interfaces are present members of *g* group
- Update their multicast forwarding tables

IGMP on traditional LAN



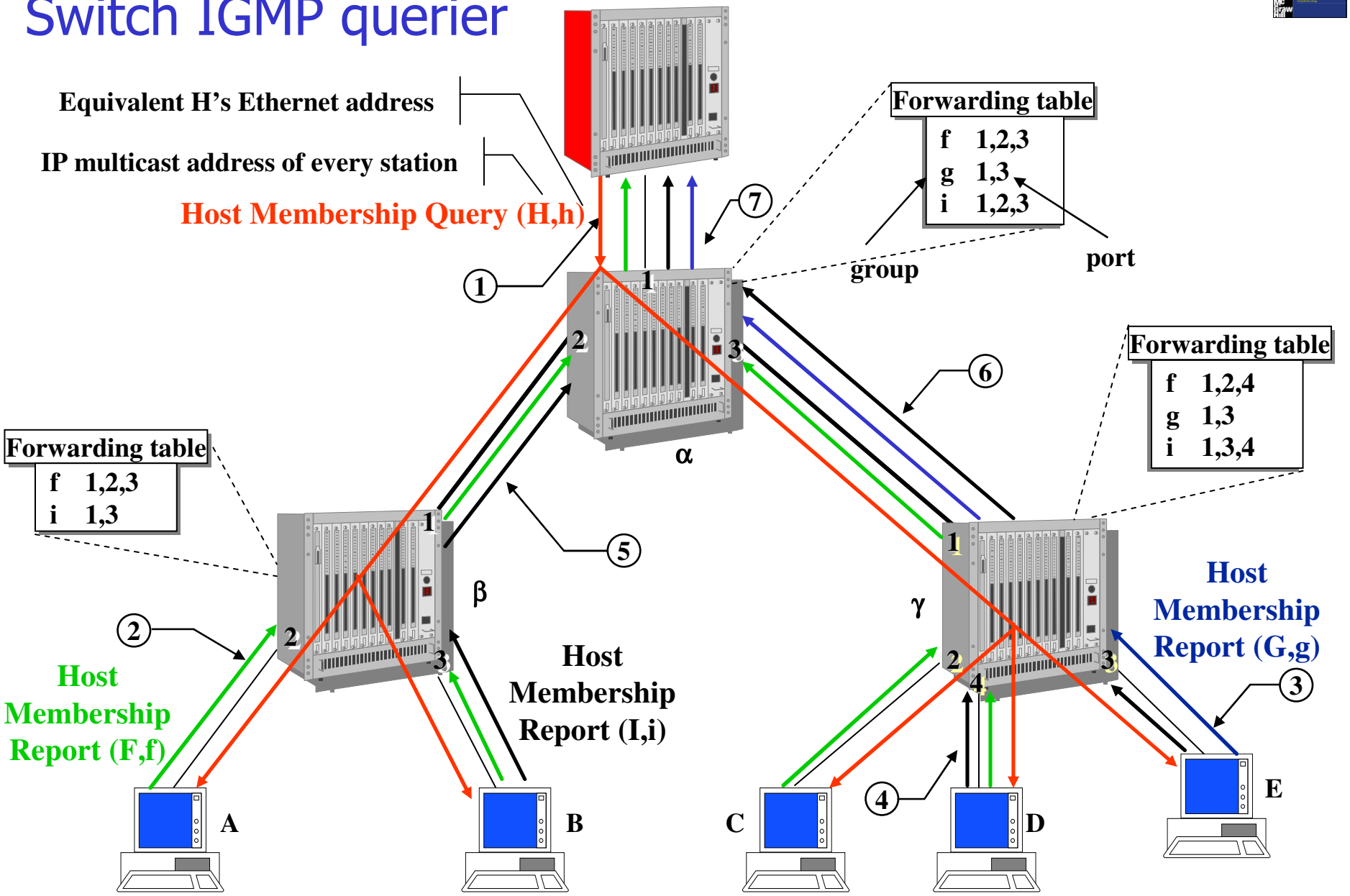
IGMP on IGMP Snooping LAN



IGMP querier function

- "*IGMP querier*" function, which is normally carried by Mrouter, can be achieved by a Switch in the network which supports this function
  - The switch periodically sends query IGMP which are used by the other switches in the network for the *IGMP snooping* function

Switch IGMP querier



Cisco switch configuration example

- Switch with *IGMP querier* function

  Switch(config)# **interface vlan** *vlan_ID*

  Switch(config-if)# **ip address** *ip_address subnet_mask*

  Switch(config-if)# **ip igmp snooping querier**

- Switch with *IGMP snooping* function
  - Global level configuration

    Switch(config)# **ip igmp snooping**
  - Interface level configuration

    Switch(config)# **interface vlan** *vlan_ID*

    Switch(config-if)# **ip igmp snooping**