EzIP Enhanced Internet

Presentation to

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Outline

A. Why this Proposal

B. What is the Solution

C. Optimum Approach

D. Technical Considerations

E. Enhanced Internet Architecture

F. Summary

A. Why this proposal

- **IPv4 address pool almost depleted**
- **IPv6 deployment sluggish**

  https://stats.ams-ix.net/sflow/ether_type.html
  https://stats.labs.apnic.net/ipv6
  http://www.circleid.com/posts/20190529_digging_into_ipv6_traffic_to_google_is_28_percent_deployment_limit/
- **ISPs in developed regions showing no interest in end-to-end connectivity**
- **Disadvantaged regions concerned with**
  - **technical challenge, and**
  - **financial burden of going to IPv6**
- **IPv4 and IPv6 coexist on Dual-Stack for quite sometime to come**

Boundary Conditions

- **Demand - By Year 2020:**
  - **Population: 7.6B (Billion) - World Statistics**
  - **IoT Devices: 50B - Average 6.6 IoTs / Person (Assumption)**

  https://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf

- **Supply - IPv4 Address Pool Size: About 4B (from 256 x 256 x 256 x256, or 4 Octets with 8 Bits each)**

- **Address Demand estimated to be 13 times over the Supply**

- **Actual usable IPv4 pool much smaller than 4B due to historical allocation practices**

  http://www.iana.org/assignments/ipv4-address-space/ipv4-address-space.xhtml

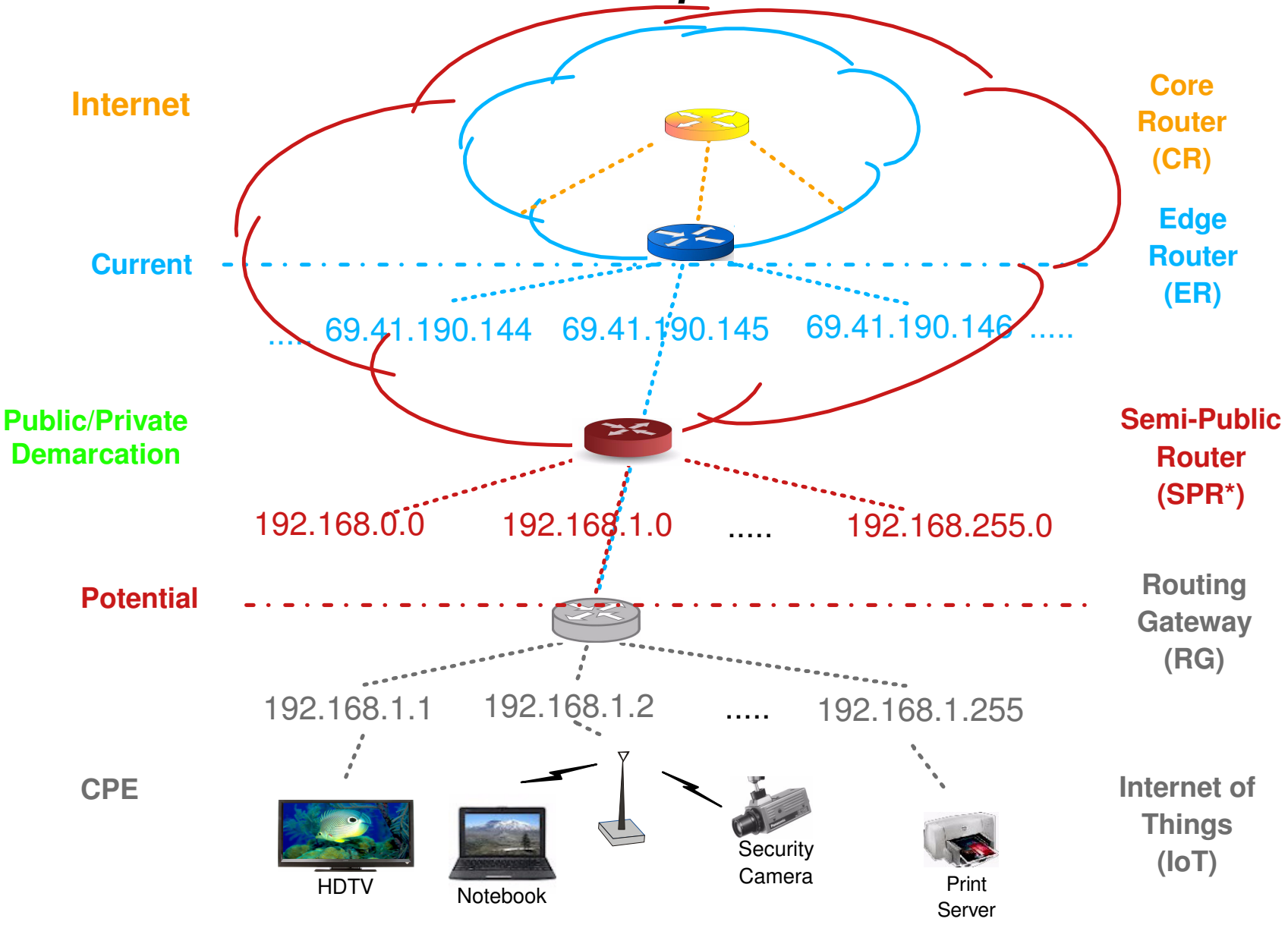
B. What is the solution

- **Expand assignable IPv4 public address pool:**
  - **Introduce Semi-Public Router (SPR) - A simple IPv4 compatible new router**
  - **Insert an SPR inline, between an Internet Edge Router (ER) and the private premises it serves, to expand the assignable public addresses**
  - **Designate a block of addresses within the IPv4 pool for SPR to use**

(Refer to example - next slide)

Common Practice

Semi-Public Router Example -- 192.168.K/24



* SPR - US Patent Pending

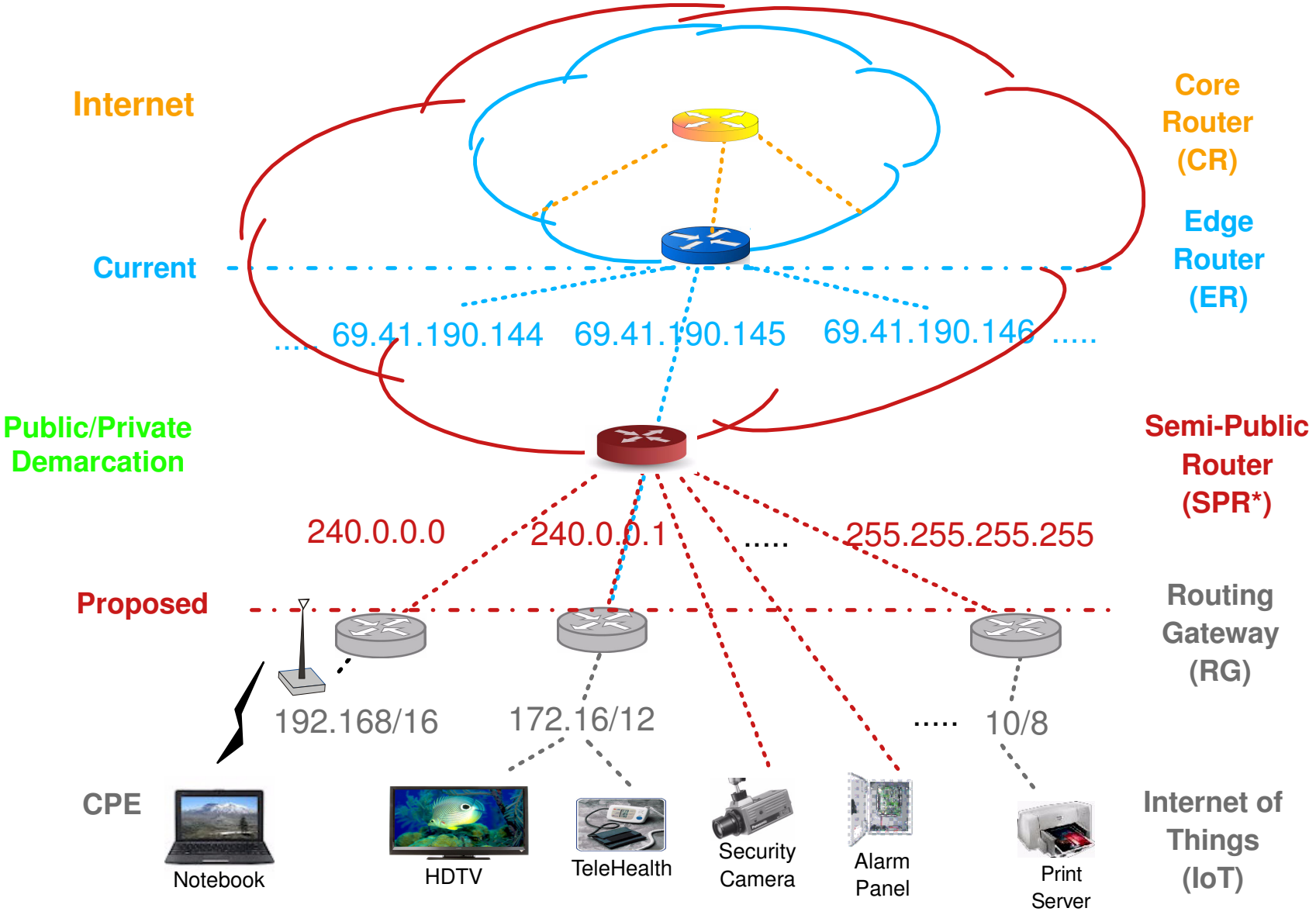
C. Optimum Approach

- **The 240/4 netblock:**
  - **From 240.0.0.0 through 255.255.255.255 whose first four bits are all "1", totaling 256M addresses**
  - **Reserved for "Future use" since 1981-09: Not routable - neither publicly nor privately**
  - **Offers the potential of multiplying each current IPv4 public address by 256M times, yet**
  - **Does not impact existing public and private networks, nor IoTs**

(Refer to Optimum EzIP example - next slide)

Optimum EzIP

-- 240/4 (240.0.0.0 - 255.255.255.255)



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D. Technical Considerations

- **APNIC: Requested to redesignate 240/4 netblock for "Private Use" (Note: Section 2. Caveats of Use)**

  https://tools.ietf.org/html/draft-wilson-class-e-02

- **RFC 791: Defined Option mechanism in the IP Header (Figure 9)**

  https://tools.ietf.org/html/rfc791

- **Over a dozen of Option numbers available**

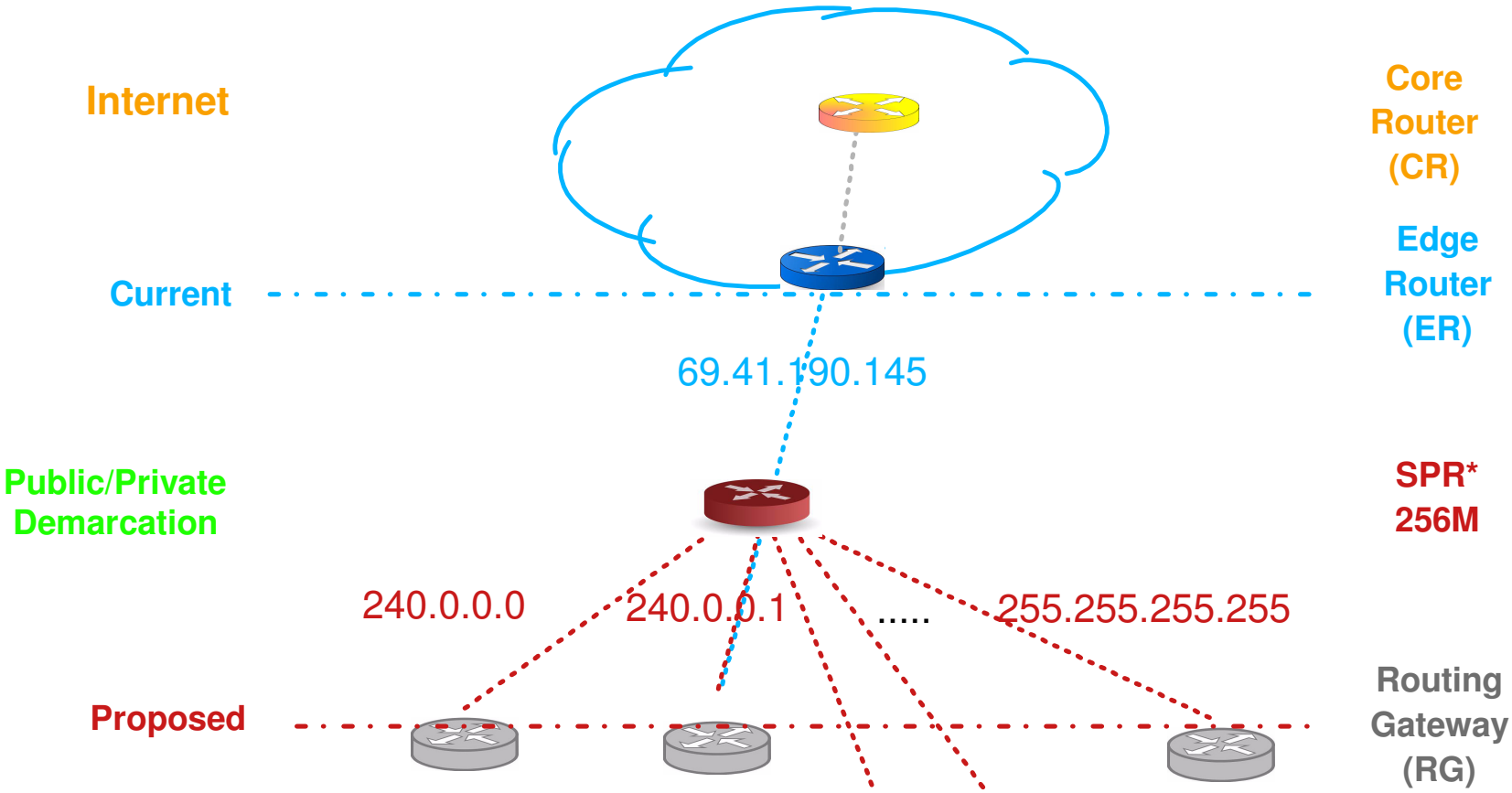
  http://www.iana.org/assignments/ip-parameters/ip-parameters.xhtml
  https://tools.ietf.org/html/rfc6814

- **Draft EzIP Proposal**

  https://tools.ietf.org/html/draft-chen-ati-adaptive-ipv4-address-space-07

(Refer to Enhanced Internet Architecture example - next slide)

Regional Area Network (RAN)



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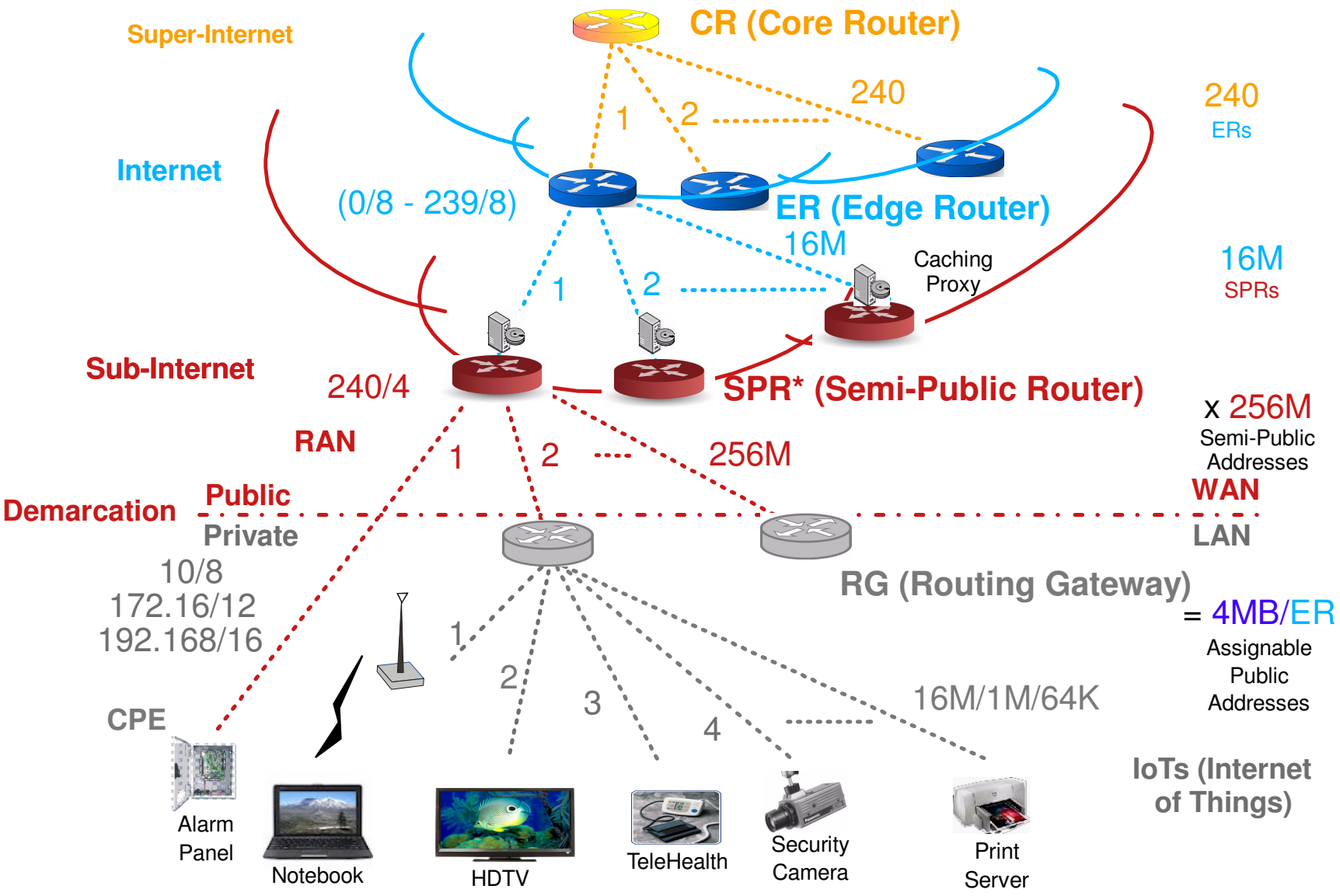
E. Enhanced Internet Architecture



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F. Summary

- **Address Expansion**
  Multiply each IPv4 address by 256M fold
- **Deployment Configuration**
  Sub-Internet consisting of Autonomous RANs
- **Operation Discipline**
  Inherent GeoLocation Property
- **Enhanced Architecture**
  CR with ERs as Super-Internet Backbone
- **Growth Ready**
  239 new worldwide Internet-sized networks