



# Connecting Remote Sites/Teleworkers

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**IP PRODUCTS**  
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## Opportunities

- Increase Revenue
  - In retail, lost calls can mean lost revenue
  - Better service than the competition can win customers
- Increase Productivity
  - Automate routine tasks (Auto attendant and IVR scripts, voice response systems)
  - Reduce the human latency
- Reduce Cost
  - Reduce reoccurring toll charges

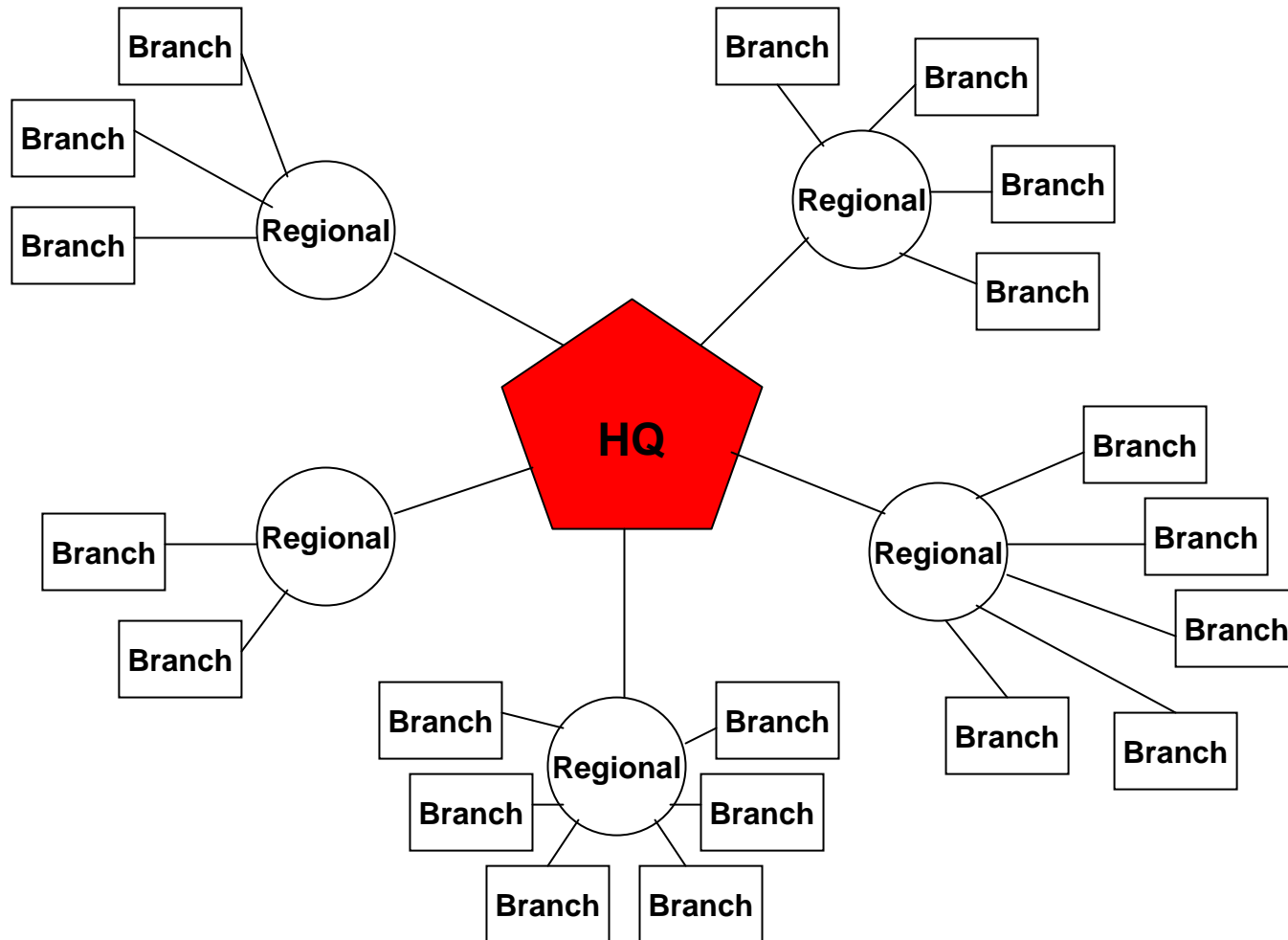
## Challenges

- Scale
  - Features
    - Page All is probably not expected to ring every phone at every location.
    - Should “Line 1” ring on every phone at every location.
    - Dialing Plan
  - Management
    - How to keep the database and software up to date at every location
  - Mobility
    - How to deal with the mobility of IP Phone users
- QoS
  - QoS within a site
  - QoS between sites
- Survivability

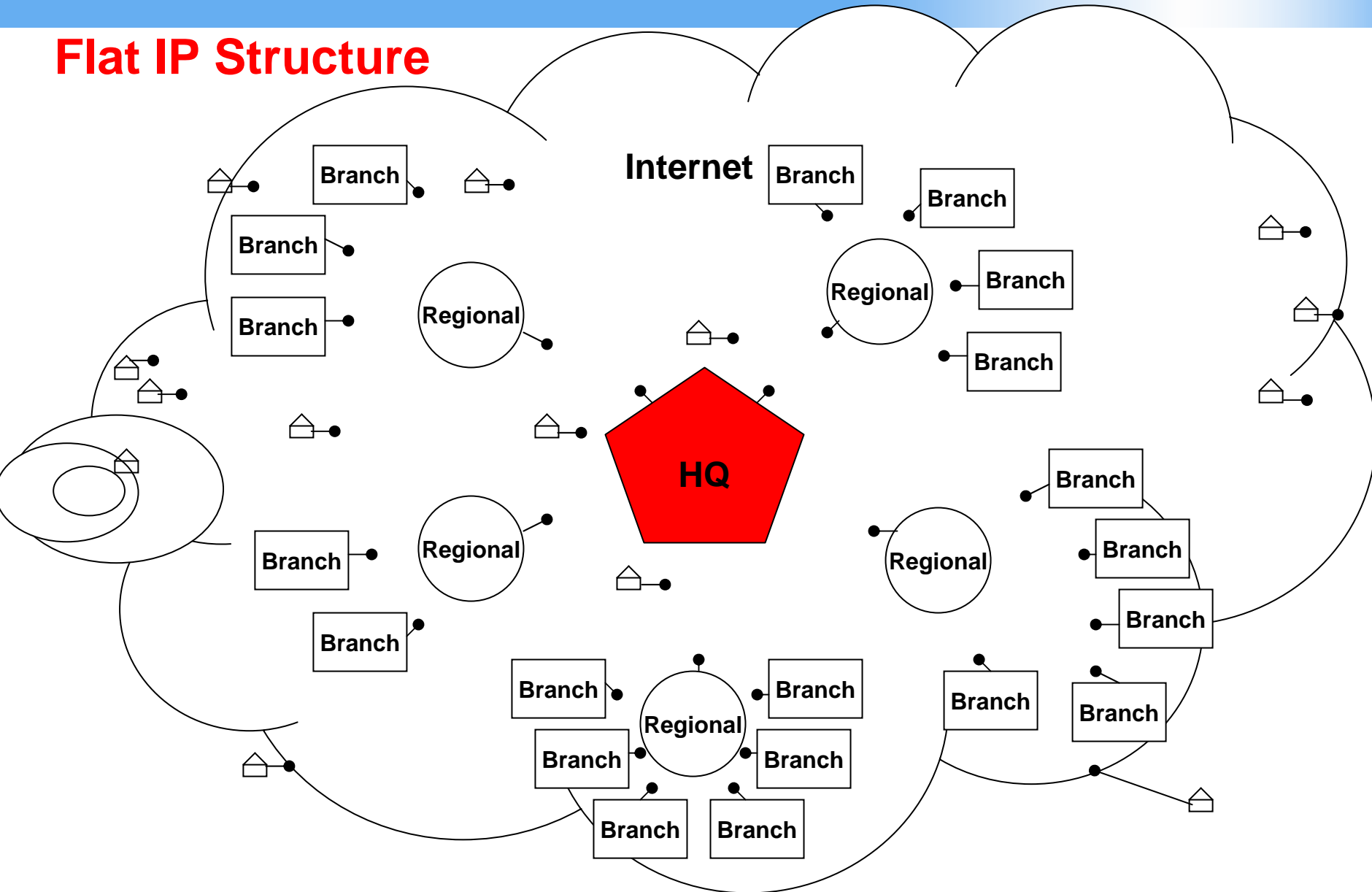
## Architectures

- One giant site
- Integrated but separate sites
- Combinations of the above

## Large Bus. Hierarchical Structure



## Flat IP Structure



## How will IP Telephony change wide-area architectures for multi-site networks with many small sites?

- IP networks are flat
- Won't need dedicated, point to point tie lines
- Dialing Plan
  - <region><store><extension>
  - <store><extension>
  - <extension>
- Big Site features vs. Small Site features

## **Can the challenges posed by telecommuting--security, network address translation, quality of service and remote management--be adequately addressed in today's products?**

- VPNs provide stellar security and work well with voice
  - You have to be conscious of the IP paths
- Encryption is less computational overhead than voice compression, but will increase bandwidth (40%)
- NAT issues are transparent within a VPN
- STUN and other techniques resolve NAT issues for phones behind a NAT.
- Network Assessments

**What changes need to be made to WAN access links at smaller sites to take full advantage of a more centralized VOIP architecture. Which WAN services/technologies should be deployed?**

- IP
- Bandwidth Management
- QoS
  - MPLS
  - Diffserv
- VPN or Managed VPN

## What upgrades will telecommuters and remote offices need to their CPE to enable IP Telephony at these sites?

- VPN Server
- Bandwidth Management
- QoS

For bandwidth considerations, did you know

- G.711 (64kbit) call at 20mSec frames is:
  - 80 kbits IP Only 112kbps w/VPN
  - 80.8 kbits on PPP on a T1 112.8kbps w/VPN
  - 87.2 kbits on Ethernet 119.2kbps w/VPN
  - 106 kbits on xDSL 148.4kbps w/VPN
  - 202.4 kbps on 802.11b 234.4kbps w/VPN

## **How might an enterprise combine CPE and carrier services to extend IP Telephony to all its users?**

- Work with a carrier that can deploy an MPLS network to as many sites as possible.
- Use VPNs with bandwidth management for sites that cannot be reached through a carrier's network.
- Deploy IP telephones at home locations

## Summary

- IP Telephony makes new features available at small locations and integrates geographically distributed businesses
- Advanced planning is advised
  - Centralized / Distributed Tradeoffs
  - Features
  - QoS
  - Network Assessment