

The Benefits of ALL-IP Networks

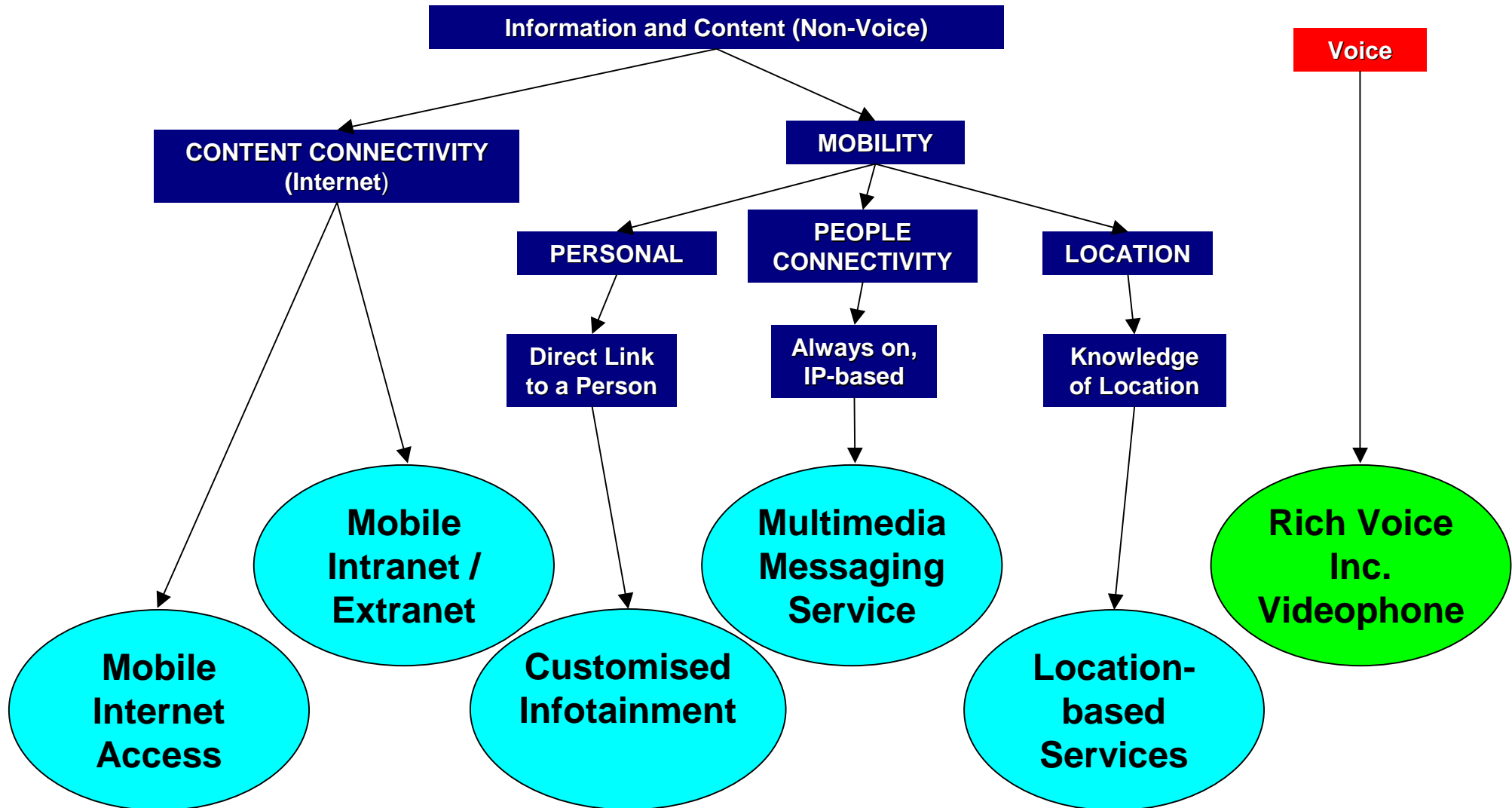
Andy Wilton

Director of GSM Applied Research

Motorola

Drivers for Packet Services

UMTS Forum Study Services and Applications



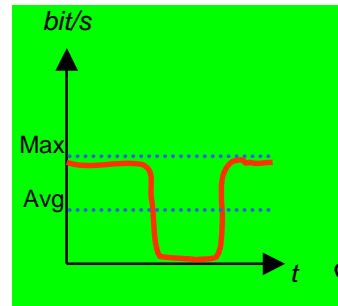
Key Services Identified

Services – Resource Occupancy



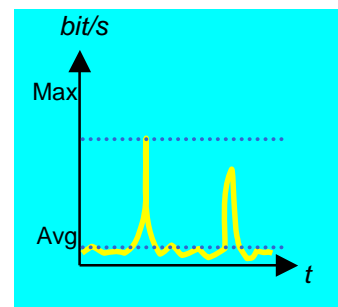
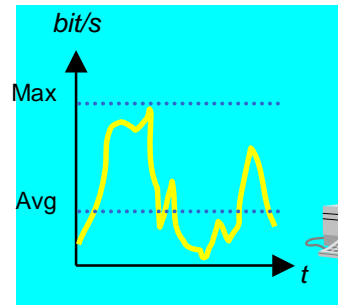
• Real-Time or Streaming Media:

- High Data- Rate and Low Delay
- Increasingly Commodity Service

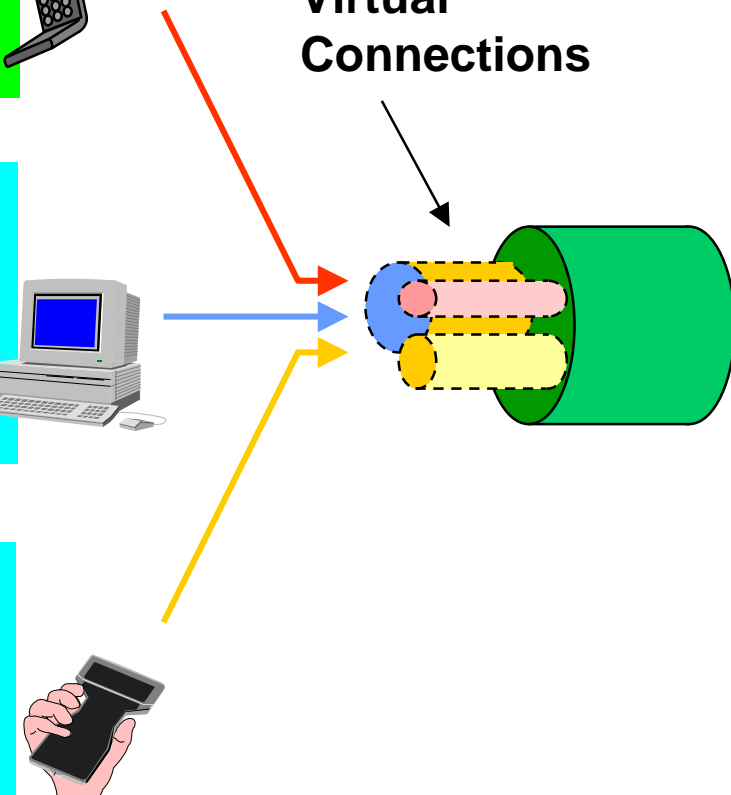


• Content Based Services – Often:

- Low Data Rate & Delay Tolerant
- Sold on Replacement Value



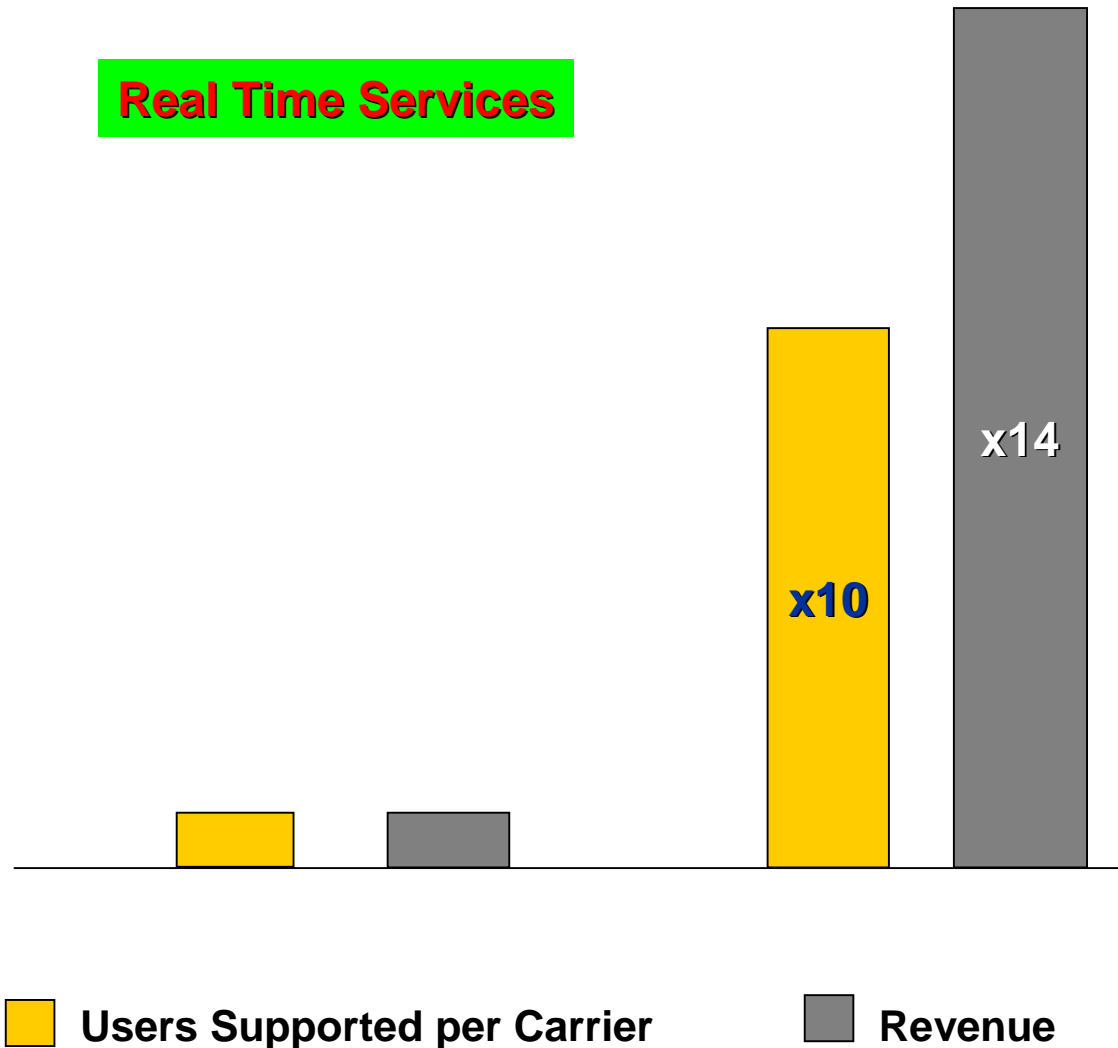
Virtual Connections



- The Cost of Different Services is Not the Same
- Real Time or Streaming Media
 - Degrade the link budget
 - maximum cell size is smaller
 - small cell size for entire region of high rate service
 - Opportunity Cost
 - high rate services quickly use up cell capacity
 - exclude other lower rate users
- Content Based Services
 - are almost free
 - vending machine
 - 1000 bytes/day
 - sometime that day

Real Time Services

Content Based Services



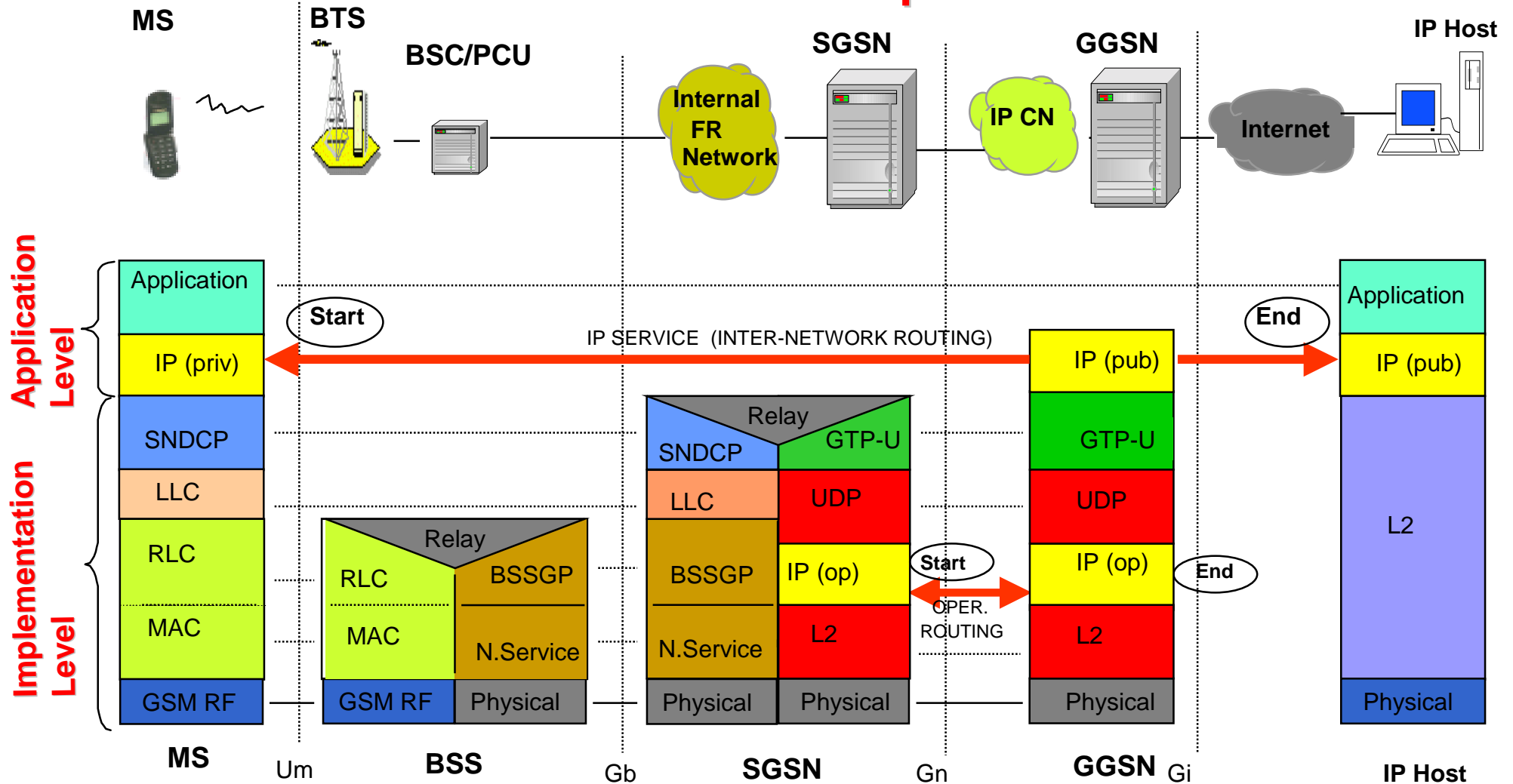
- Number Packet Users >>Circuit
- Revenue/Service higher
 - e.g.the Vending Machine
 - substitutes for
 - cost of employee
 - cost of capital (van etc.,)
 - tariff set on value

What is an 'ALL IP Network'

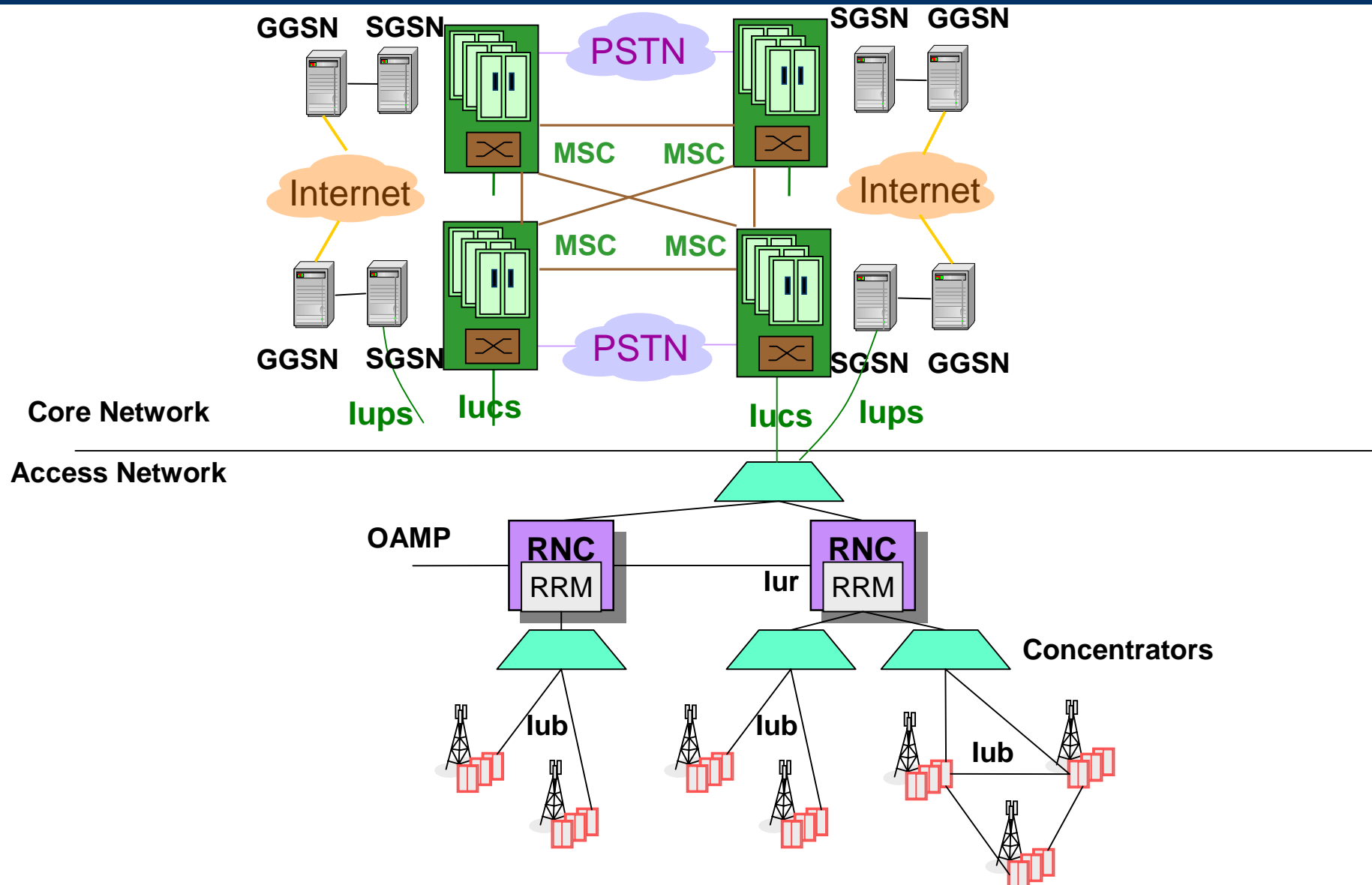
IP Has Multiple Roles



GPRS Example



UMTS R99 Architecture

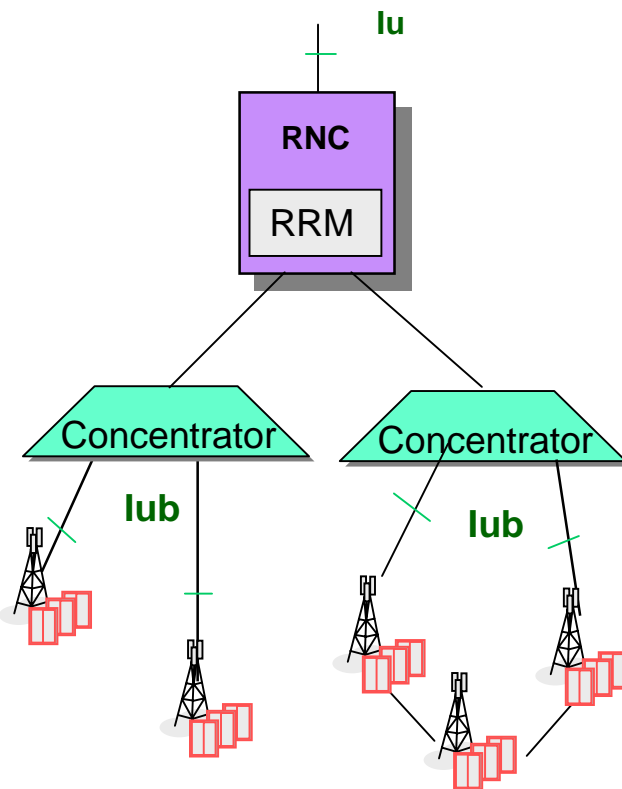


UTRAN Architecture Evolution



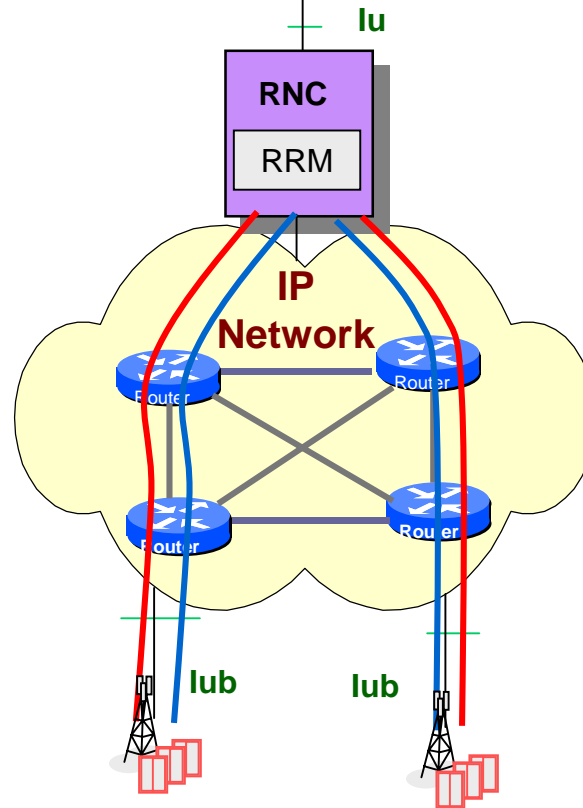
Hierarchical

- point-to-point ATM
- concentration



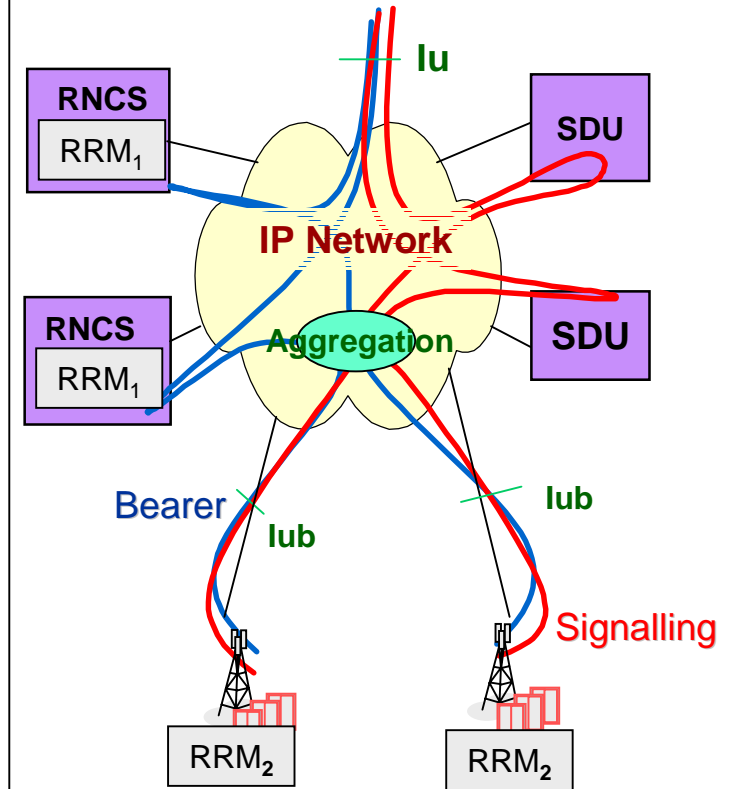
IP UTRAN

- IP routing
- IP transport
- point-to-point Node B Link



Peer-to-Peer

- Node B re-parenting RNC
- Signalling/bearer separation
- Distributed RRM

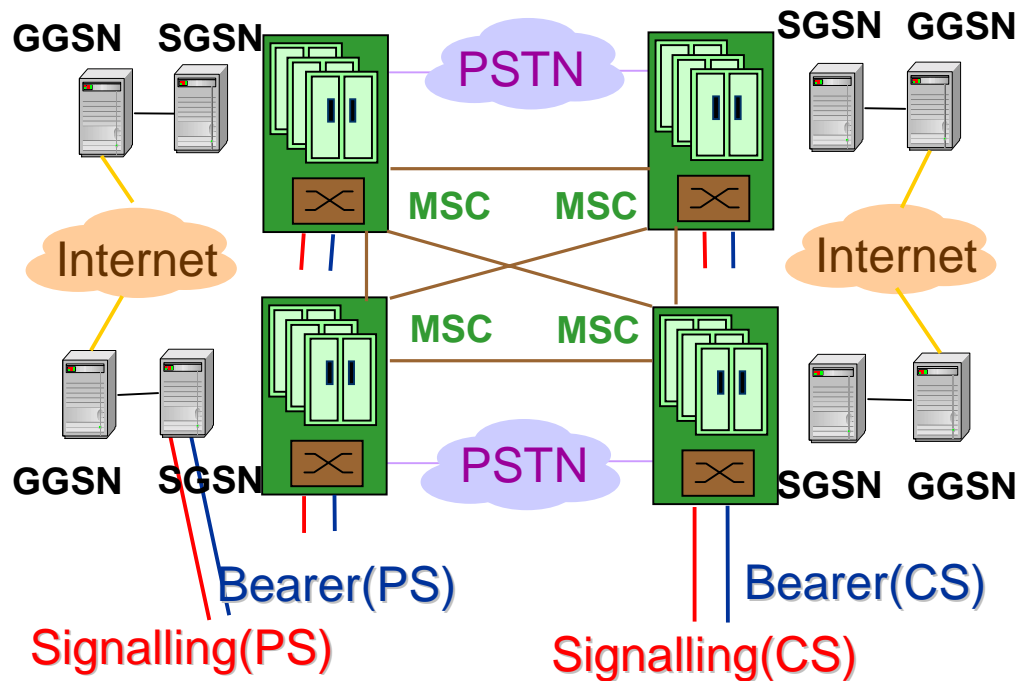


RNC - Radio Network Controller RRM – Radio Resource Management

CORE Network Evolution

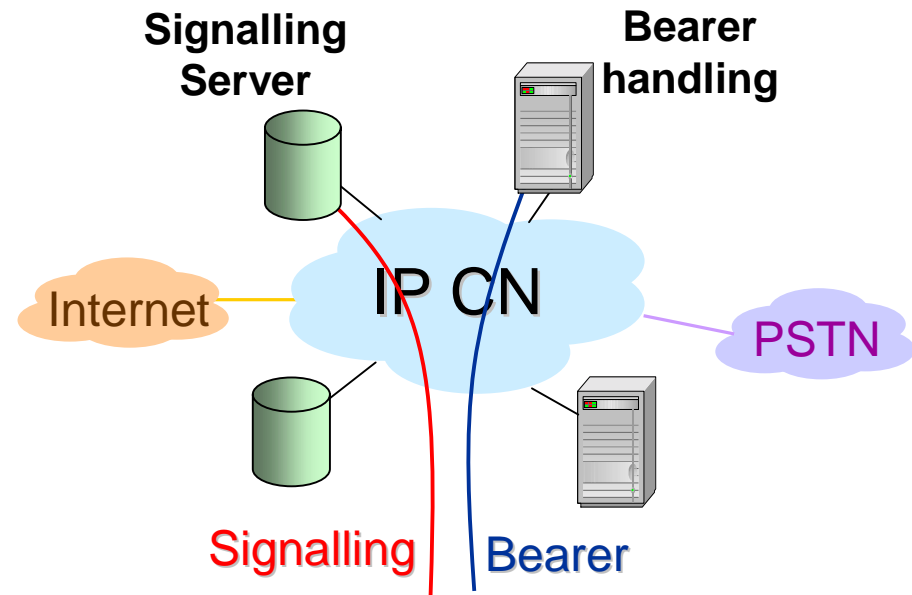


Hierarchical



- Switching equipment: expensive
- Point to point ATM - trunking inefficiency
- Homogeneous bearers between NE
- + QoS well managed
- Signalling and traffic follow same path

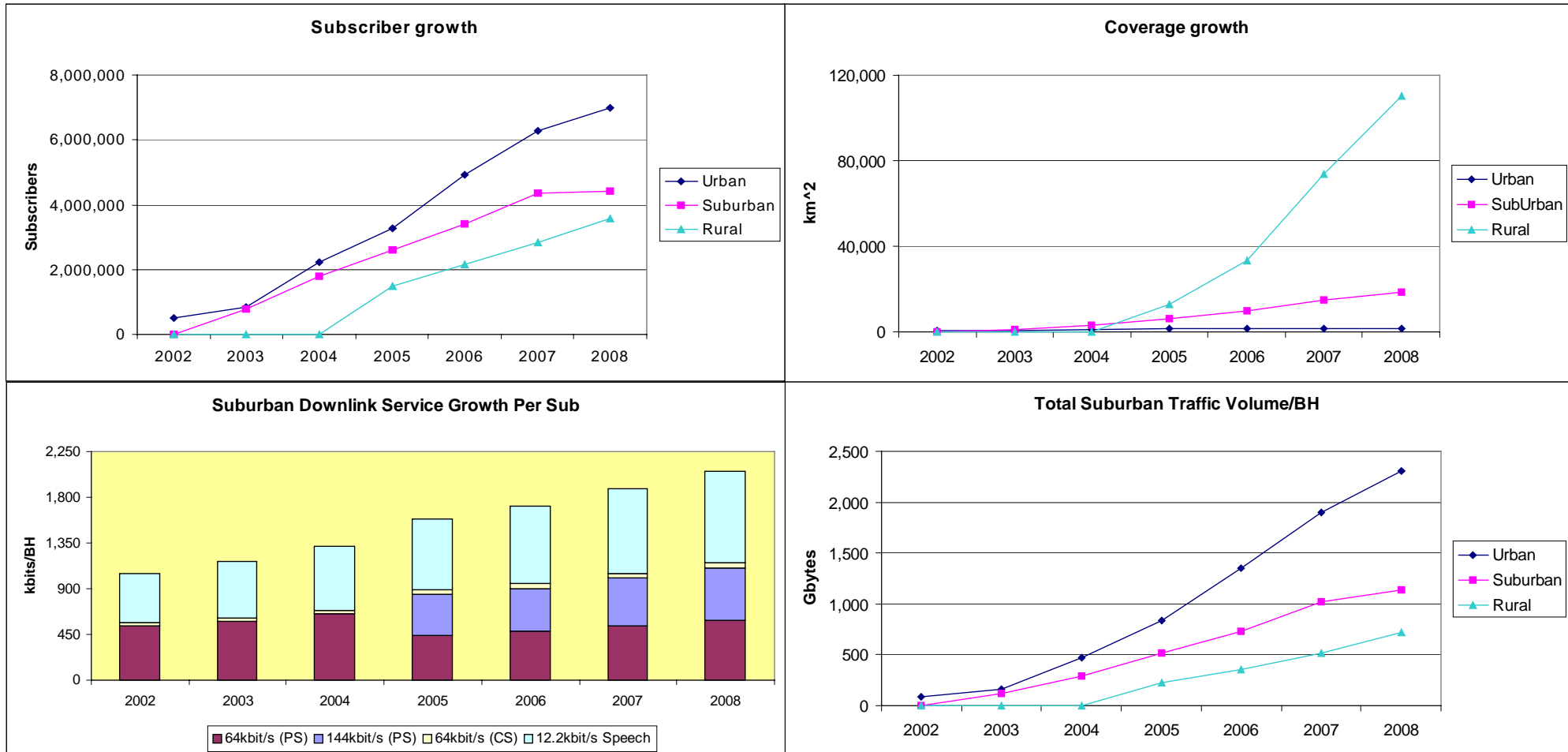
Distributed



- + Routing equipment: lower cost
- + Multiple routes - better N/W availability
- + Use of multiple bearers as required
- + Bearer & control separation - scalability
- + Incremental investment

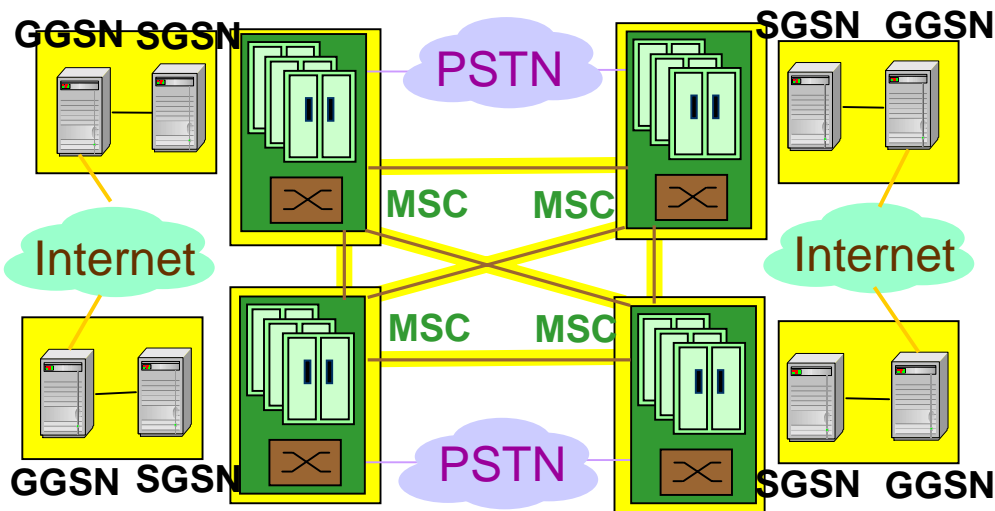
The Cellular Environment

Cellular Traffic Mix Changes vs Time

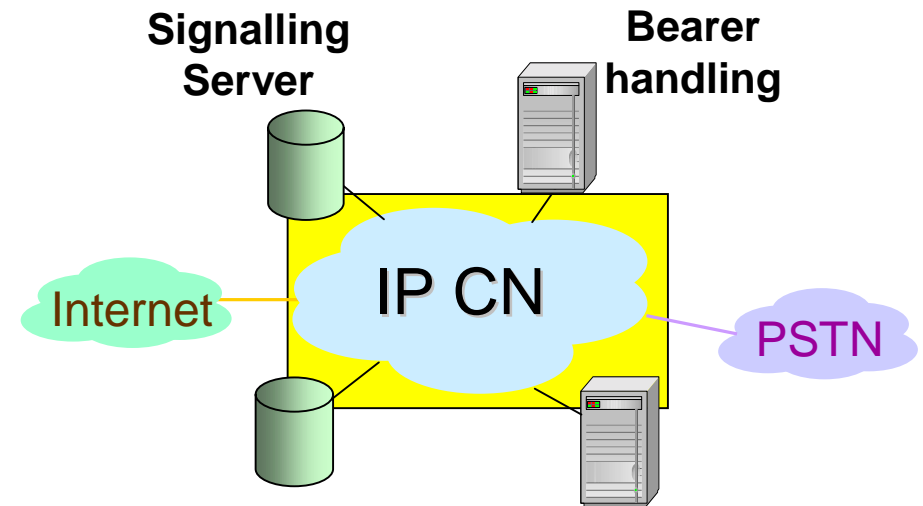


All IP Network - Considerations

Hierarchical



Distributed



 - Equipment upgrades

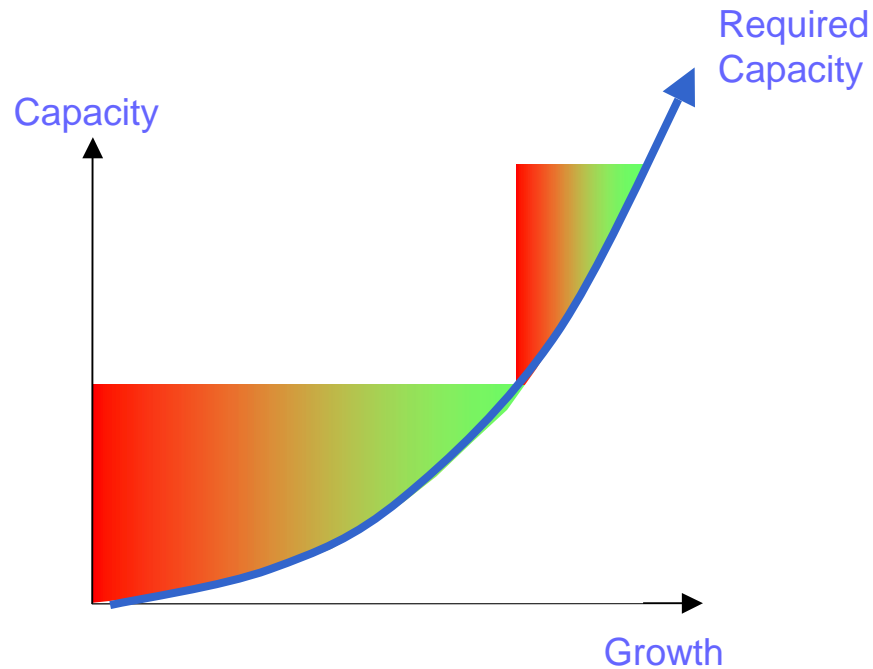
Service Mix Changing Over Time

- ◆ MSC Data Field reconfiguring
- ◆ Rebalance circuit and packet networks
- ◆ Sensitive to mix
- ◆ Incremental transmission upgrades
- ◆ Less sensitive to traffic mix changes
- ◆ Single network to manage
- ◆ Element Dimensioning

Transmission Growth

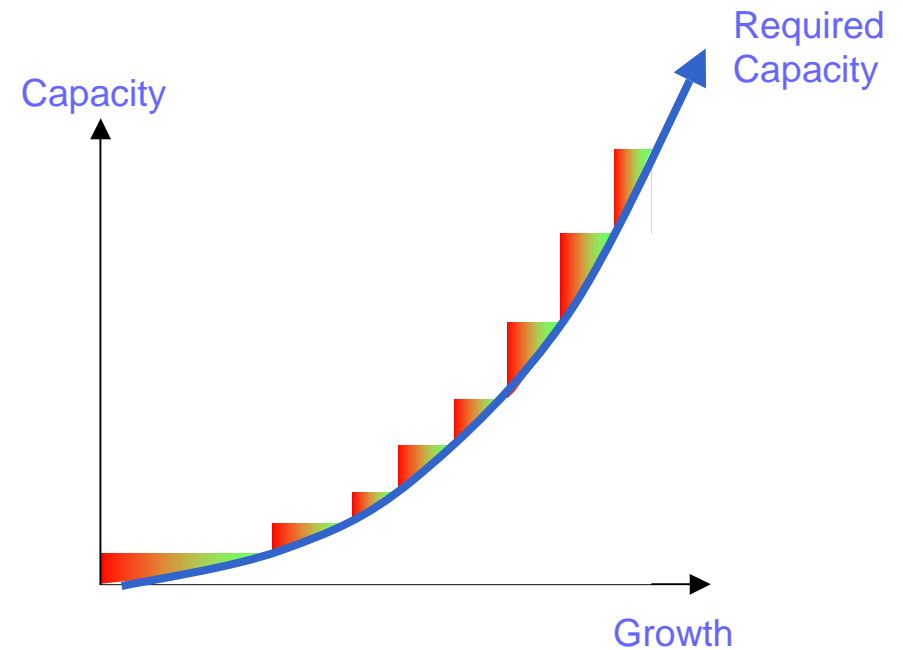


Release 99 Core



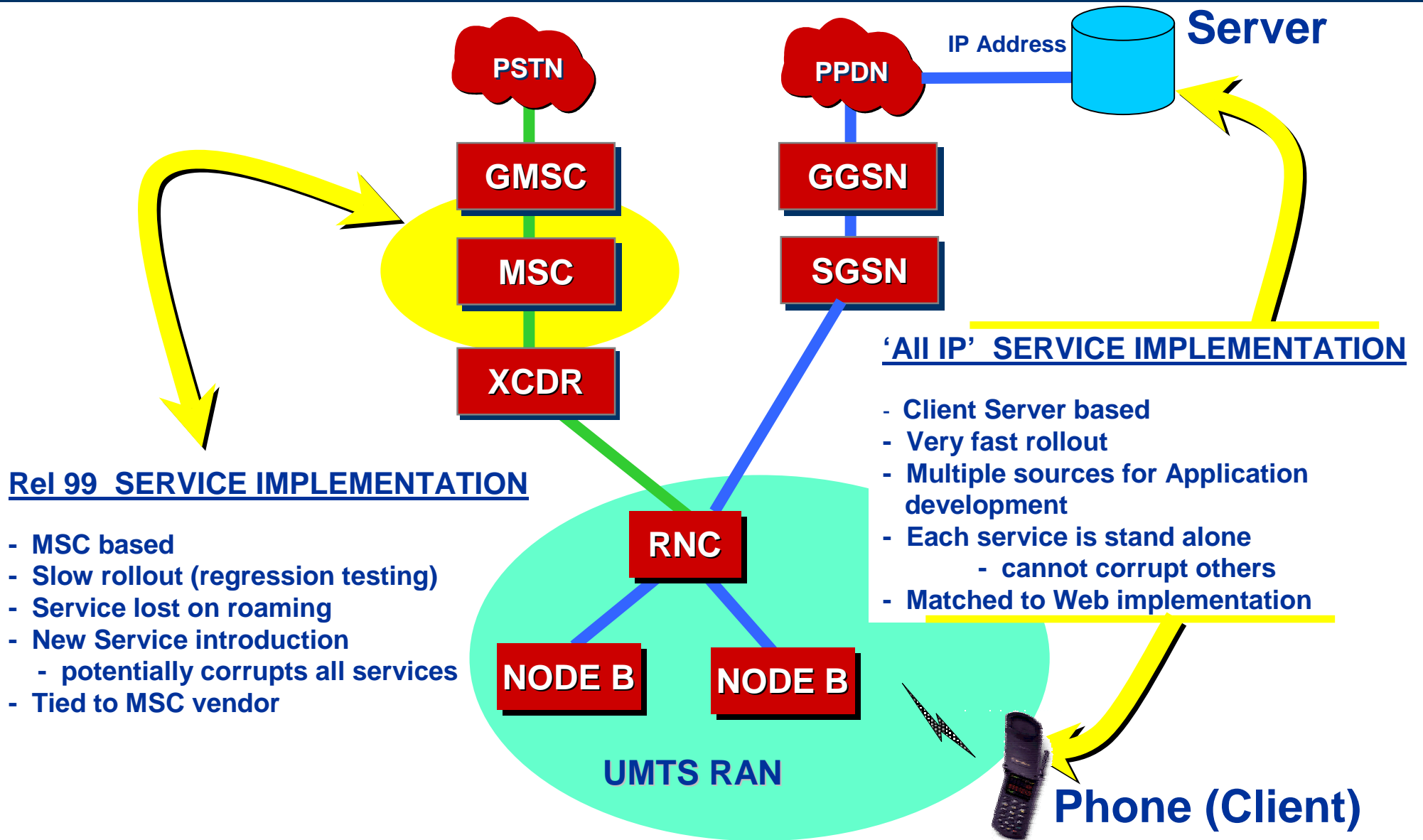
- ◆ Large capacity increment

All IP Core



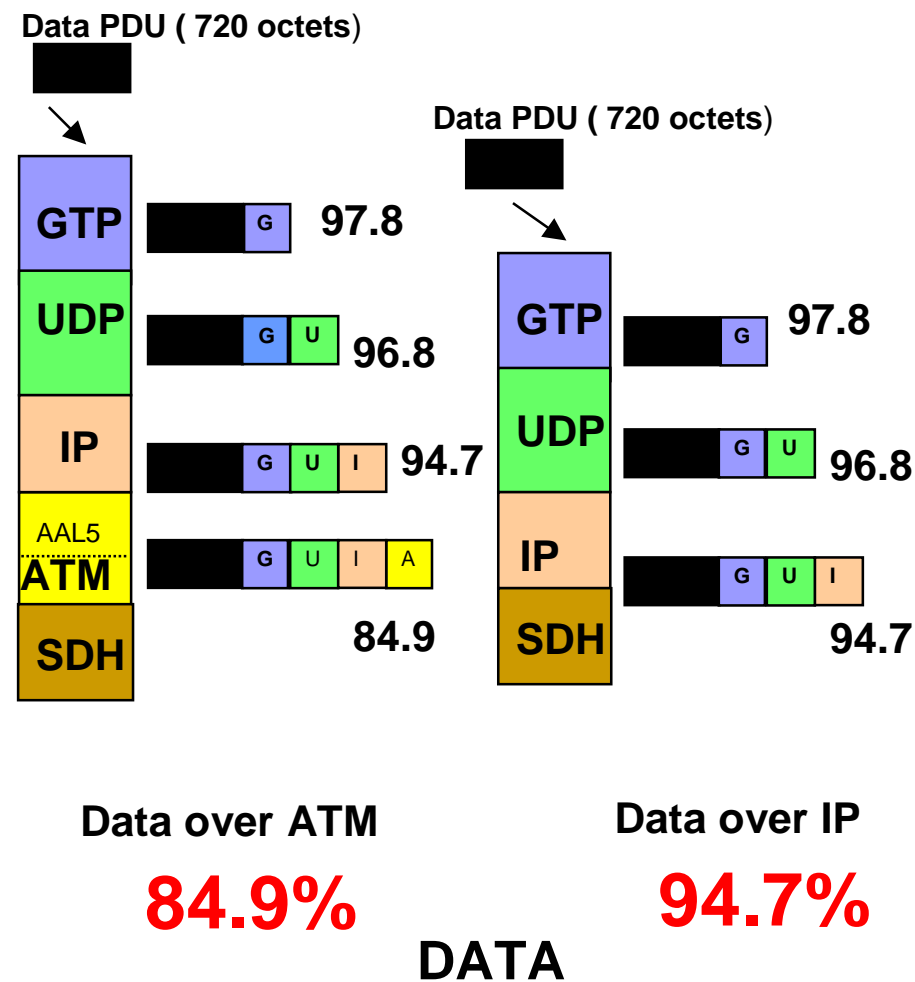
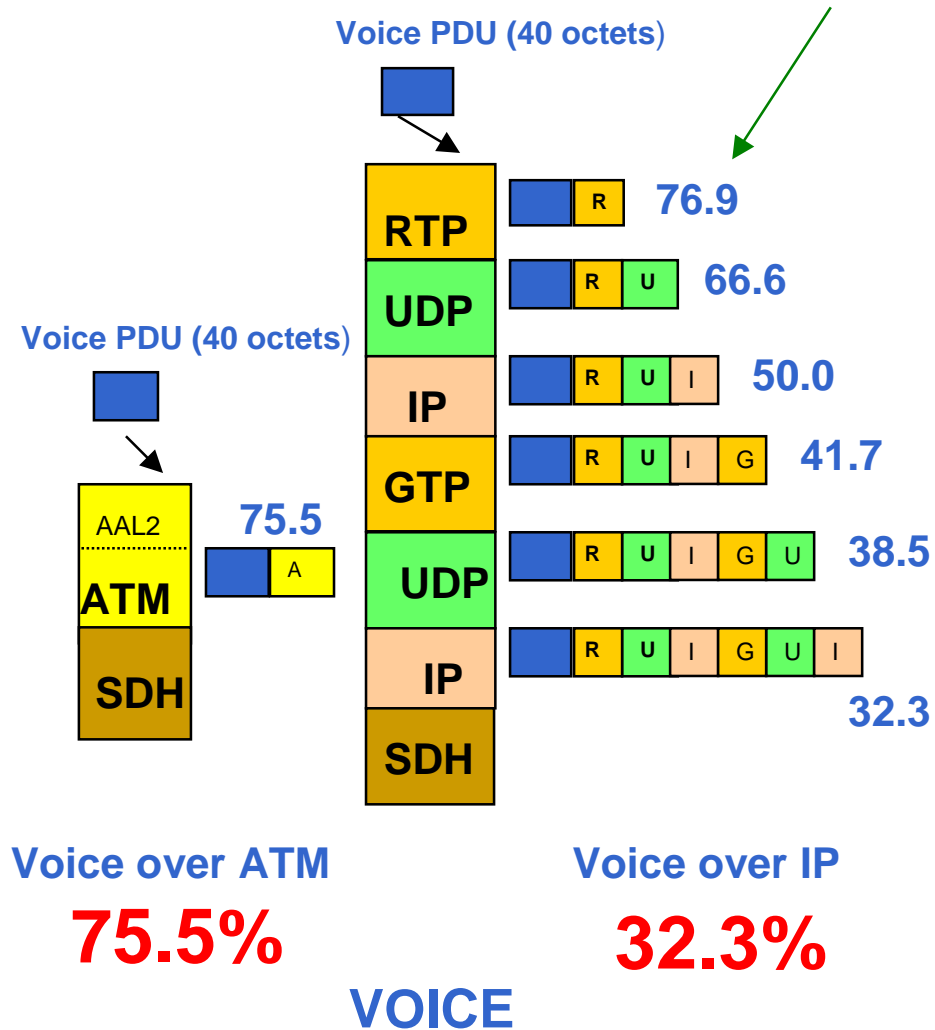
- ◆ Capacity - incremental investment
- ◆ Resilience

Service Dis-aggregation / Time to Market



Protocol Overheads

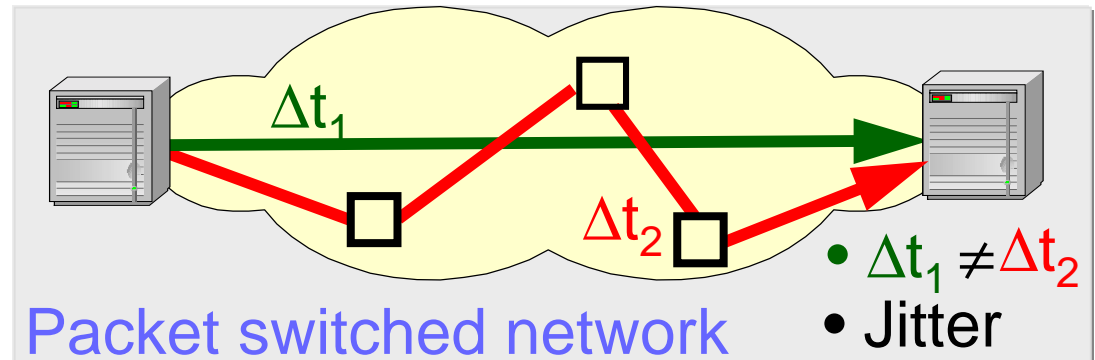
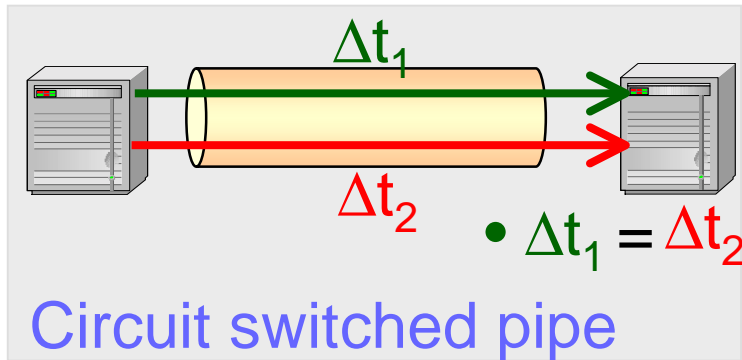
%age efficiency (payload to message)



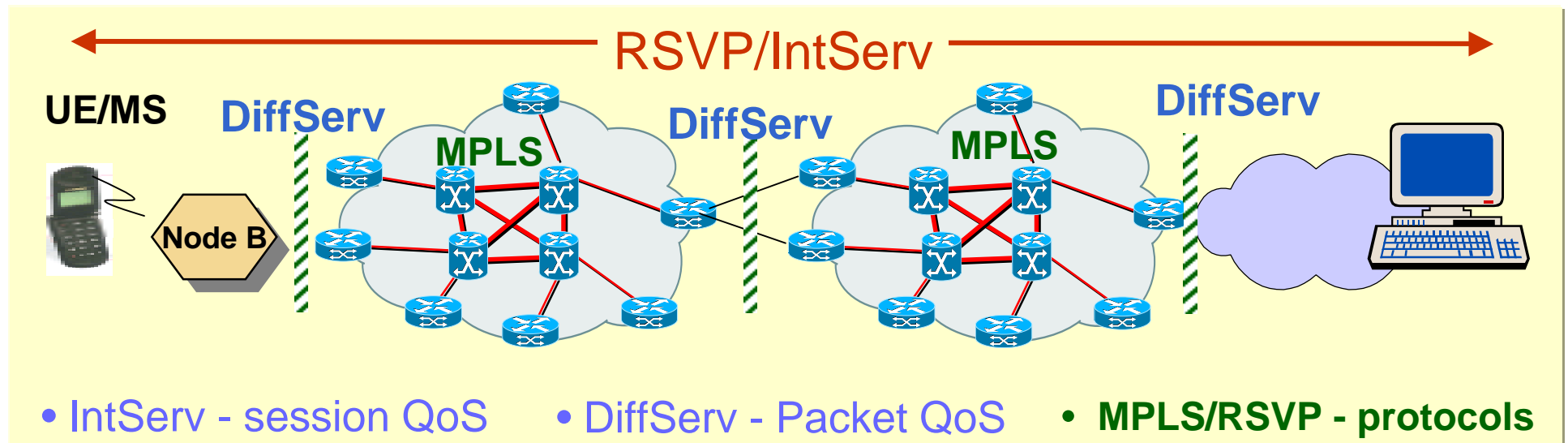
Quality of Service (QoS)



QoS is defined by a number of parameters such as delay, jitter, loss



General QoS Solutions



Advantages

- **Life Cycle Cost**
 - Faster product learning curve
 - Trunking efficiency
 - Lower OA&M and Provisioning costs
 - Higher network resilience
- **Revenue Benefits**
 - Faster Service roll out
 - Application commonality with internet services
 - New service development speed (not locked to MSC regression testing)
- **Other Benefits**
 - Well matched to service/content disaggregation
 - Natural integration with the Internet

Disadvantages

- **Product availability**
 - QoS management only now being resolved
- **Need to avoid inefficient IP implementations**
 - Multiple protocol stacks

Key Benefits and Timing



Capital

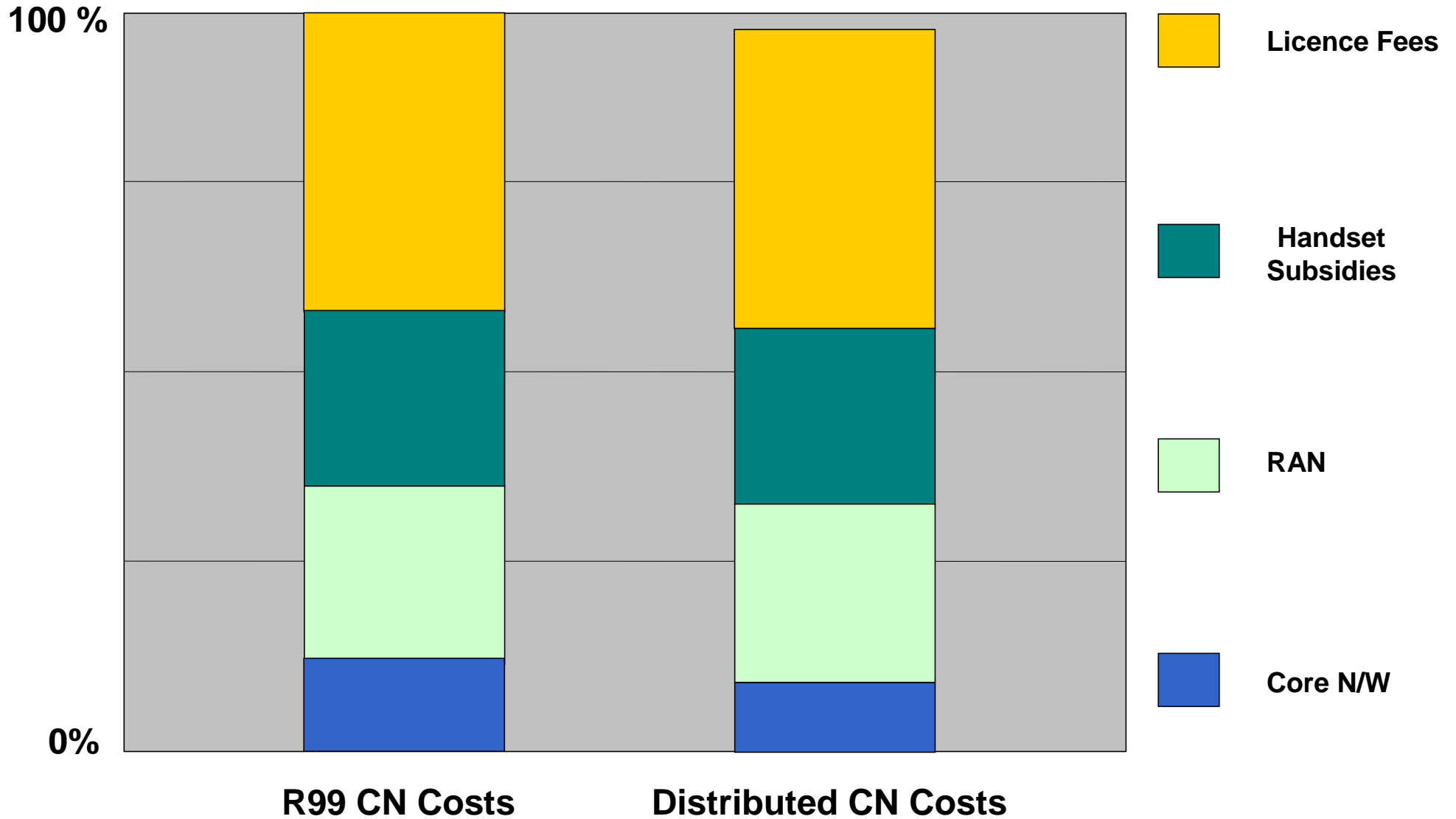
Cellular Infrastructure
Handset Subsidies
Installation/Optimisation
Spectrum Licence Fees
Services
etc



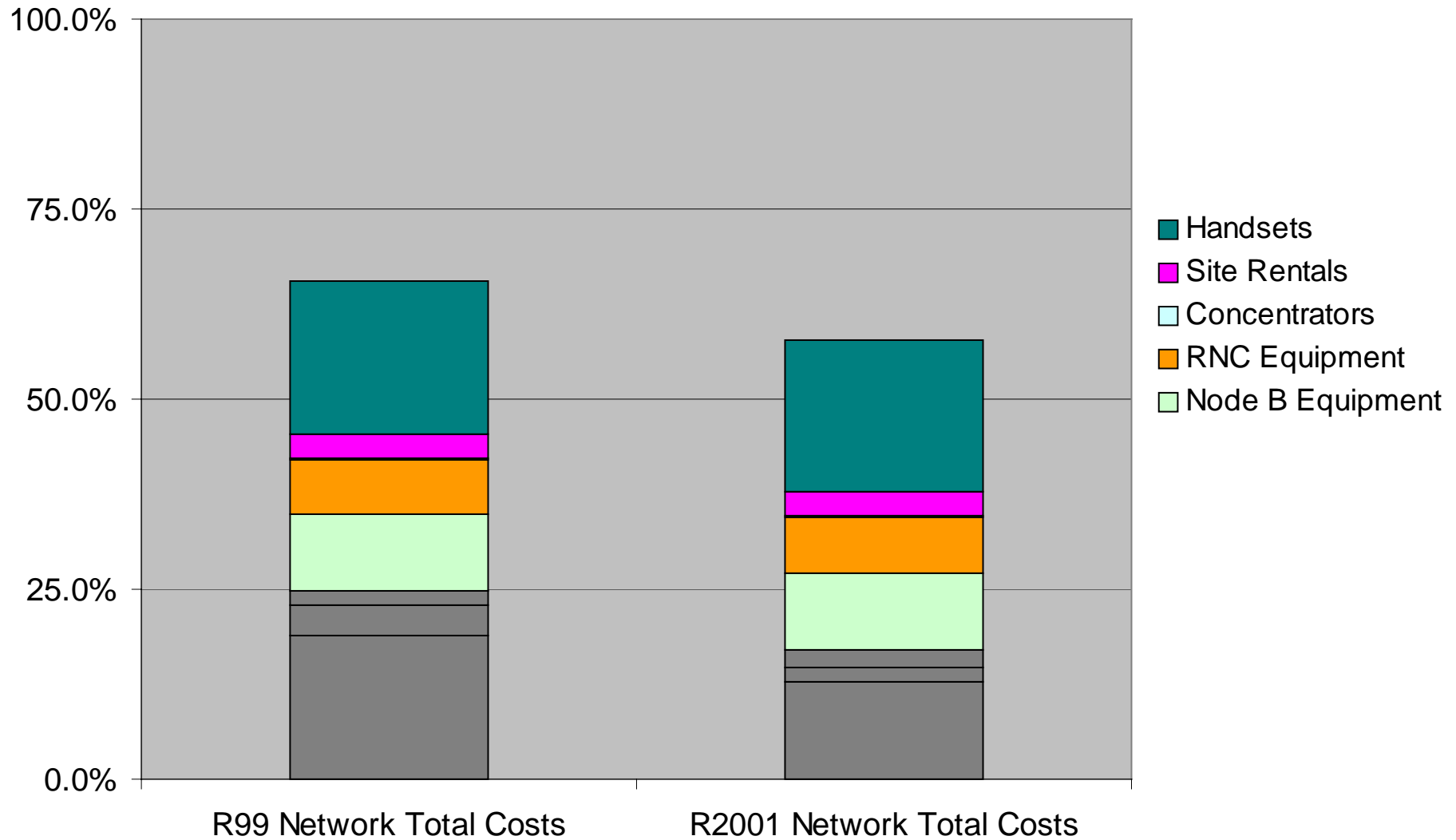
Recurring

Interconnect
Site Rental
Maintenance
Power
etc

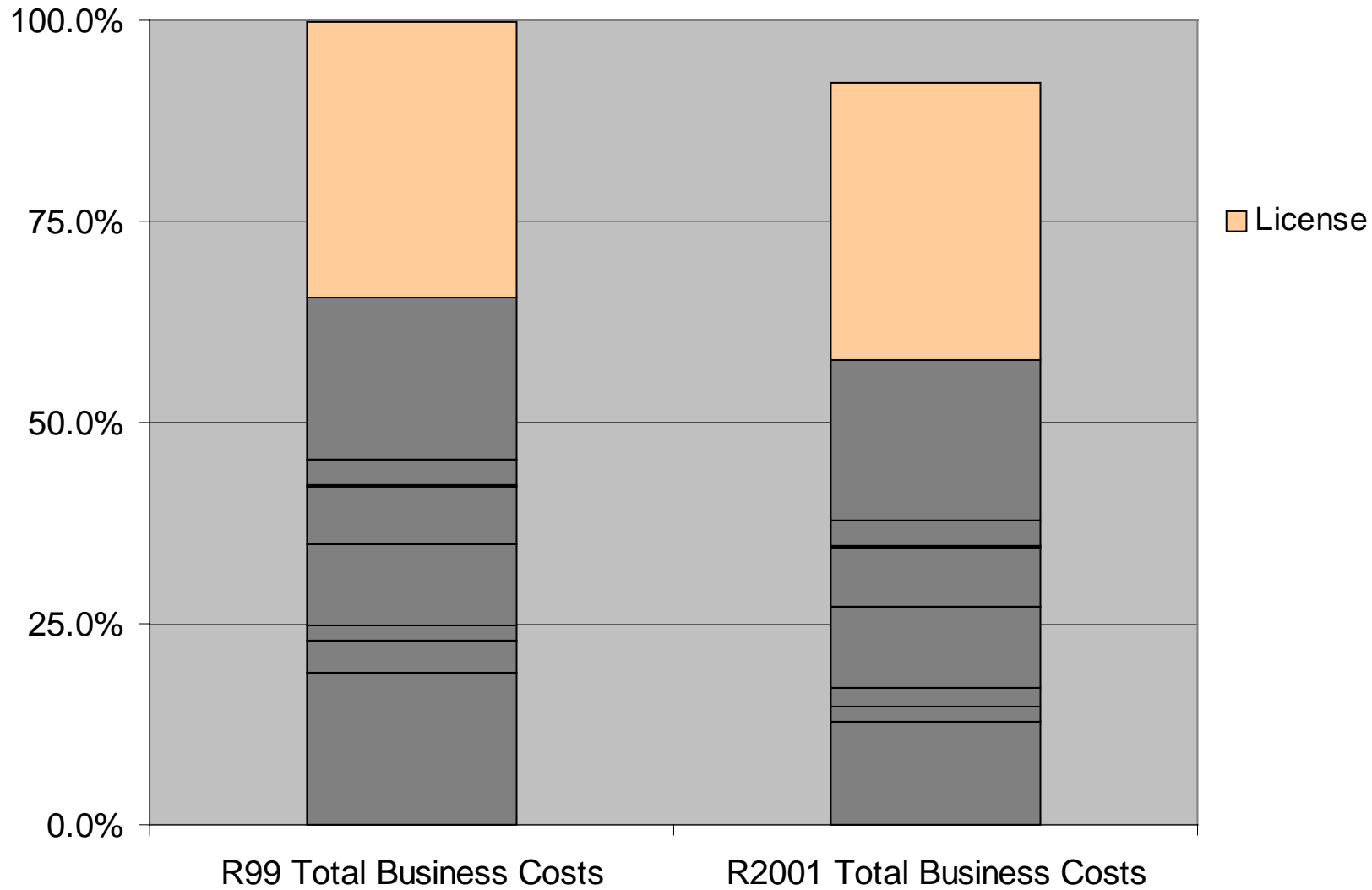
Life Cycle Network Costs



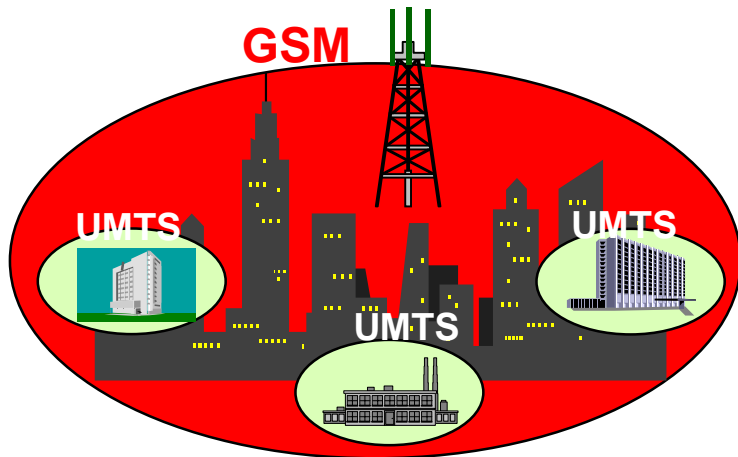
Infrastructure Life cycle Costs



Total Costs and Revenue

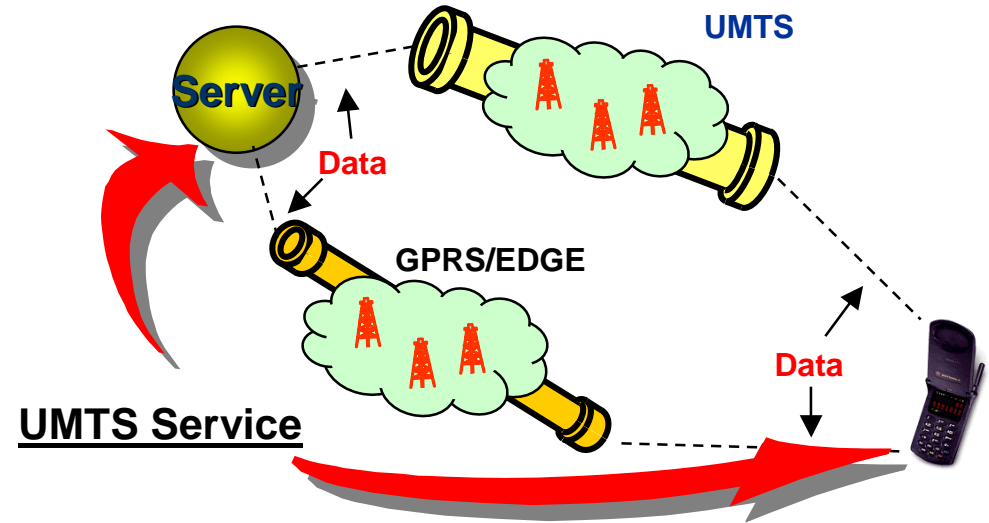


ALL IP Network Revenue Benefits – (1)



CELLULAR RF COVERAGE

- Islands of UMTS coverage
 - small cell size
 - demand driven
- Wide area coverage
 - GPRS or EDGE
- Dual mode UMTS/GSM handsets



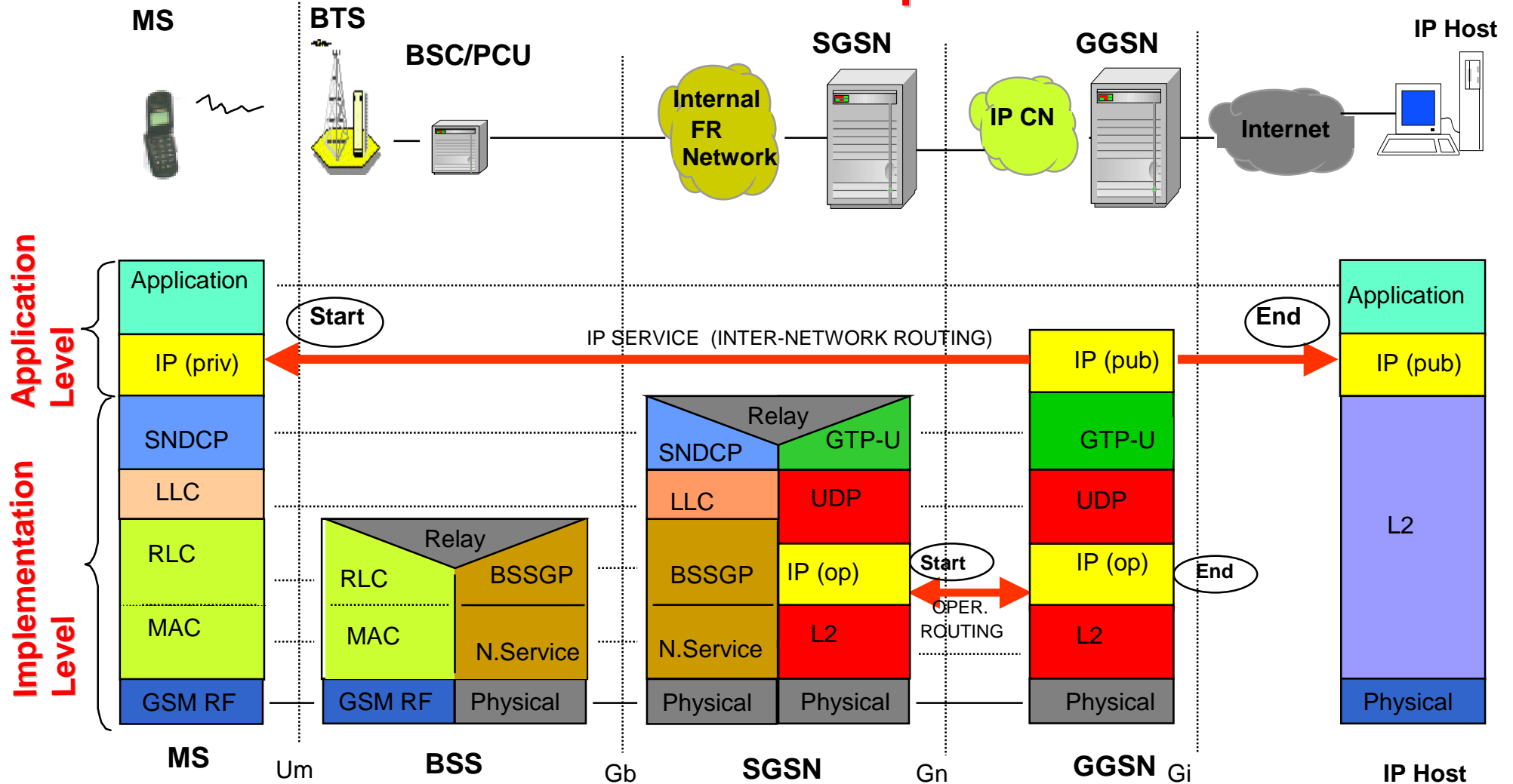
CELLULAR SERVICE COVERAGE

- Services at edge of network
 - transport via GSM or UMTS
- Service Transparent to Transport
 - between operators
 - between media (copper, mobile etc.,)
 - a few services
 - will run less well on GPRS/EDGE

ALL IP Network Revenue Benefits – (2)



GPRS Example



- ◆ **Service Dis-aggregation**
- ◆ **IP core network**
- ◆ **IP UTRAN (option)**
- ◆ **Peer-to-peer (option)**
- ◆ **Repartitioned RRM**

- Increased Revenue
 - Fastest Time to Market for New Applications
 - Revenues from Access Provision to Third Parties
- Reduced LifeCycle Cost
 - Simpler Service provisioning
 - Reduced Costs
 - Skilled Staff Availability
 - Lower Network Costs
 - IP Product Learning Curve
 - Network Scalability

**Thank You for Your
Attention**