
Enabling Personal Broadband Through Affordable Quality of Service

Dave Sonnier

Chief Technology Officer

Multiservice Networking Division

International Conference on Communication and
Broadband Networking

April 7, 2004

Agenda

- What is quality of service?
- Quality of service throughout the network
- State of the communications industry
- Network vision: enabling affordable personal broadband
- Role of network processors in traffic management
- Summary



What Is Quality of Service?

What Is Quality of Service?

- A collection of features which allows for the most efficient use of available network resources
- Required whenever there is a mismatch between available bandwidth and required bandwidth
- Where bandwidth is truly free, QoS is less important
- Bandwidth is almost never truly free!

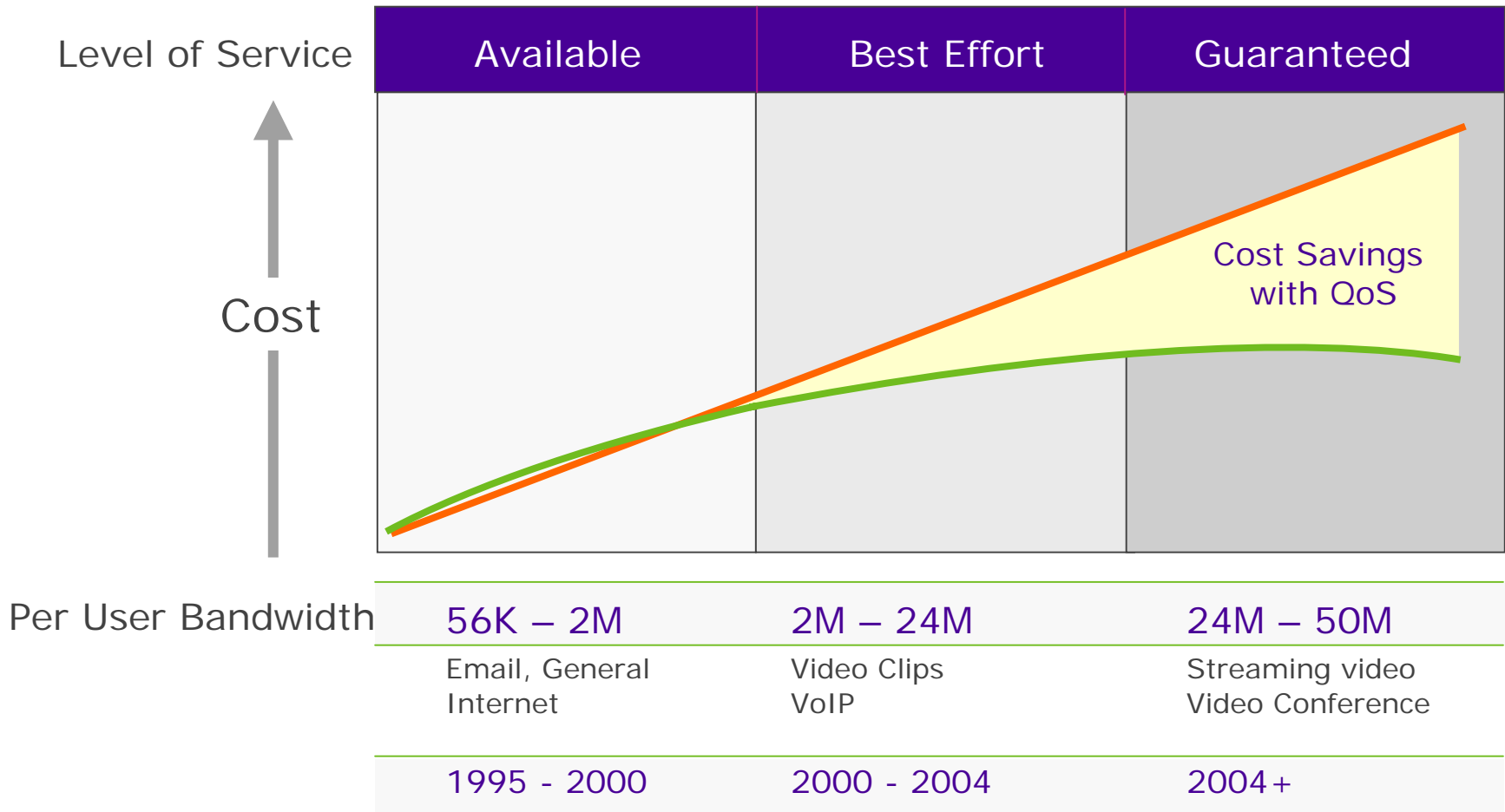
QoS Enabling Features

- Flexible classification
 - Required to apply all the other mechanisms
- Scheduling
 - Simplest QoS mechanism
 - Simple priority or weighted
- Shaping
 - Prevents congestion downstream in the network
- Policing
 - Verifying that incoming data is not too fast to protect the network
- Statistics
 - Required to monitor and tune all of the above

How Quality of Service Technology Reduces Cost and Increases Revenue

- High value services require guarantees of bandwidth, latency and jitter
- Implementations without high quality QoS require significant over provisioning to deliver even minimally acceptable results
- Affordable Quality of Service allows substantially more premium services with the same infrastructure generating more revenue

How Quality of Service Technology Reduces Cost and Increases Revenue



The Quadruple Play

- Data
 - Very minimal latency and jitter requirements
- Voice
 - Relatively low bandwidth
 - Very stringent latency and jitter
- Broadcast Video
 - Large bandwidth
 - Can be multicast very near end user
- Video on Demand/Interactive Video
 - Very large bandwidth
 - Requires end to end QoS over much more of the network

Quality of Service Throughout the Network

QoS Throughout the Network Enterprise

- QoS has not generally been an issue in the enterprise
- Enterprise networks have historically provided enough bandwidth that QoS technology has not been required
- VoIP is causing many enterprise networks to be re-evaluated for QoS
- Quadruple play will put more stress on networks

QoS Throughout the Network Wireless Access

- Half of the carrier operating expense is devoted to the radio access network connecting all the base stations
 - Optimizing the use of this bandwidth is a major way for carriers to reduce cost
- Providing next generation revenue generating services requires end to end QoS all the way to the handset

QoS Throughout the Network Wireline Access

- Historically, last mile bandwidth has been the major bottleneck in the network
 - Old cabling technologies, long distances
- New technologies promise real improvement here
 - DSL, WiMAX, Cable Modems, EFM, etc.
- It will be a very long time before all existing infrastructure is replaced
 - Optimizing the bandwidth on those low speed links will be an issue for a long time to come
- New technologies simply move congestion point to the connection from the first mile to the second mile
 - Significantly increase requirements within access equipment as well as the connections to the rest of the network

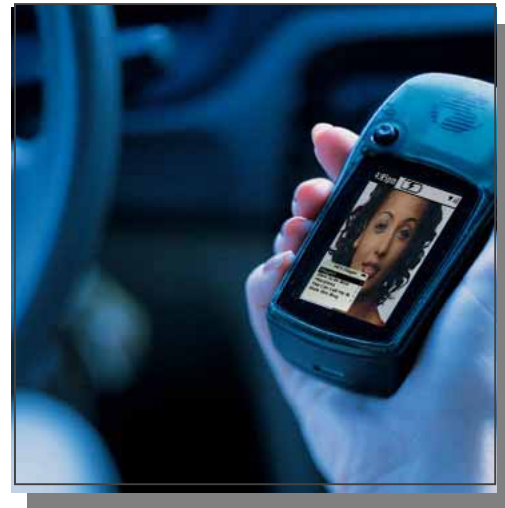
QoS Throughout the Network Edge

- Traditionally, the only place in the network that had high value QoS!
- Current deployments centered around ATM
- Ethernet is emerging
 - Enterprise grade Ethernet does not provide adequate QoS for edge applications
- Multi-Protocol Label Switching
 - Frame based protocol that can support very good Quality of Service

QoS Throughout the Network Core

- Traditionally ATM or SONET/PDH
- Frame based core networks are the clear evolution
- MPLS technology will be the key enabler
- MPLS provides the tools to implement a frame based core network
 - Lower cost than traditional core networks
 - Easier to manage and maintain
 - Better performance

State of the Communications Industry



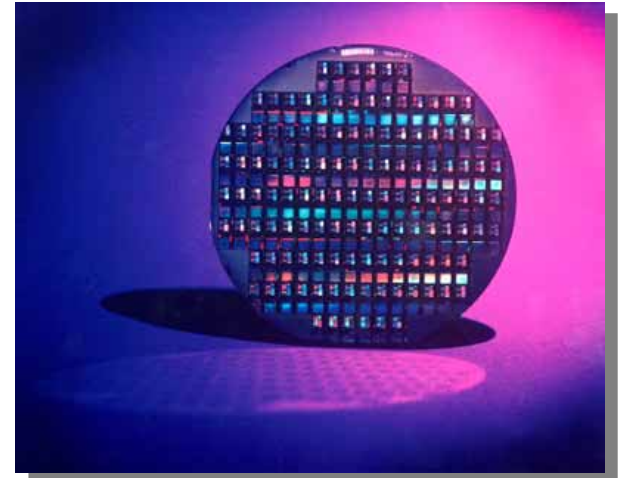
Equipment Manufacturers: Market Conditions

- Competition:
 - Fever-pitch
 - All about pricing
 - Clear need to focus on reduction of expenses
 - Low-cost, agile suppliers are succeeding
- Consolidation:
 - Companies exiting certain segments
 - Smaller players exiting the market
 - Acquisitions target near-term, niche requirements
 - Established players are able to deliver more value
- Spending:
 - Today—generating revenue from existing boxes
 - Feature and service enhancements
 - Next generation—multiservice equipment, enabling service providers to deliver broadband and generate more revenue



Semiconductor Industry: Market Conditions

- Fierce competition
- Lost generation of design wins
- Companies still focused on reducing expenses
- Companies exiting, entering market segments
- Rise of foundries means greater emphasis on design skills and IP
- Industry maturing
- Bright spots: wireless and wireline access



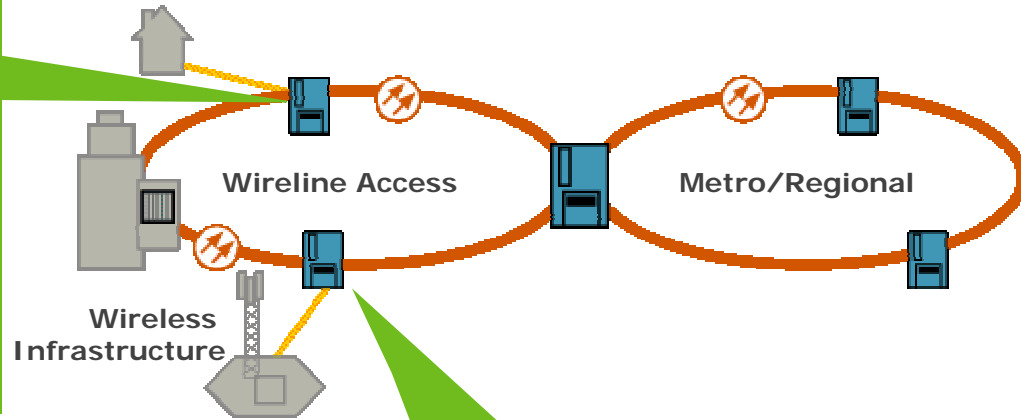
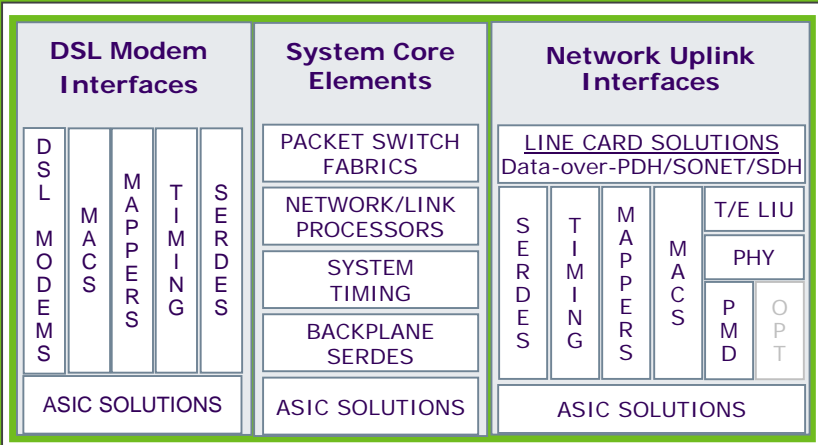
Key Drivers for Success

- To win in the communications marketplace, semiconductor companies must have:
 - Industry leading products and technology
 - End-to-end solutions
 - Partnerships to fill gaps
 - System-level expertise
 - Validated application solutions, not just chips
 - Focus on market segment leaders
 - Exceptional customer service
 - Vision for the network

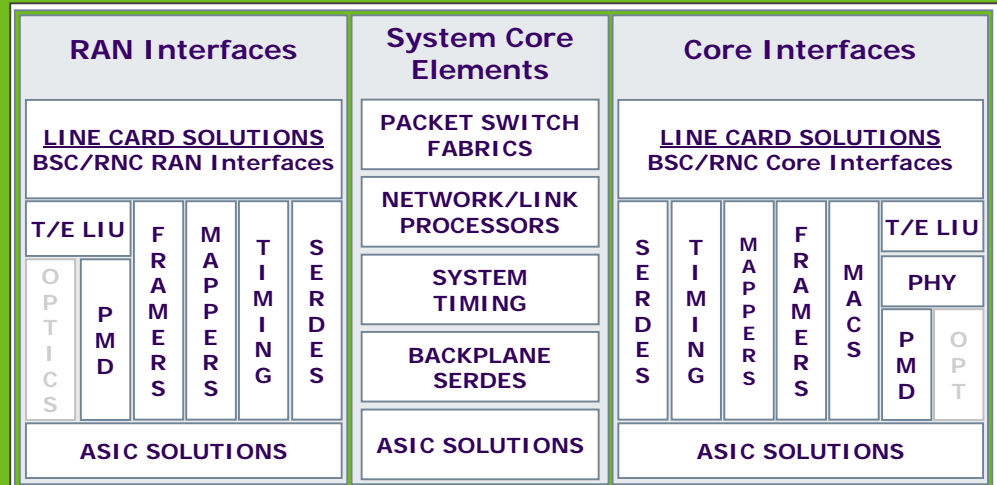


A Solutions Approach: Architecting Lowest Costs

DSL Access Multiplexer



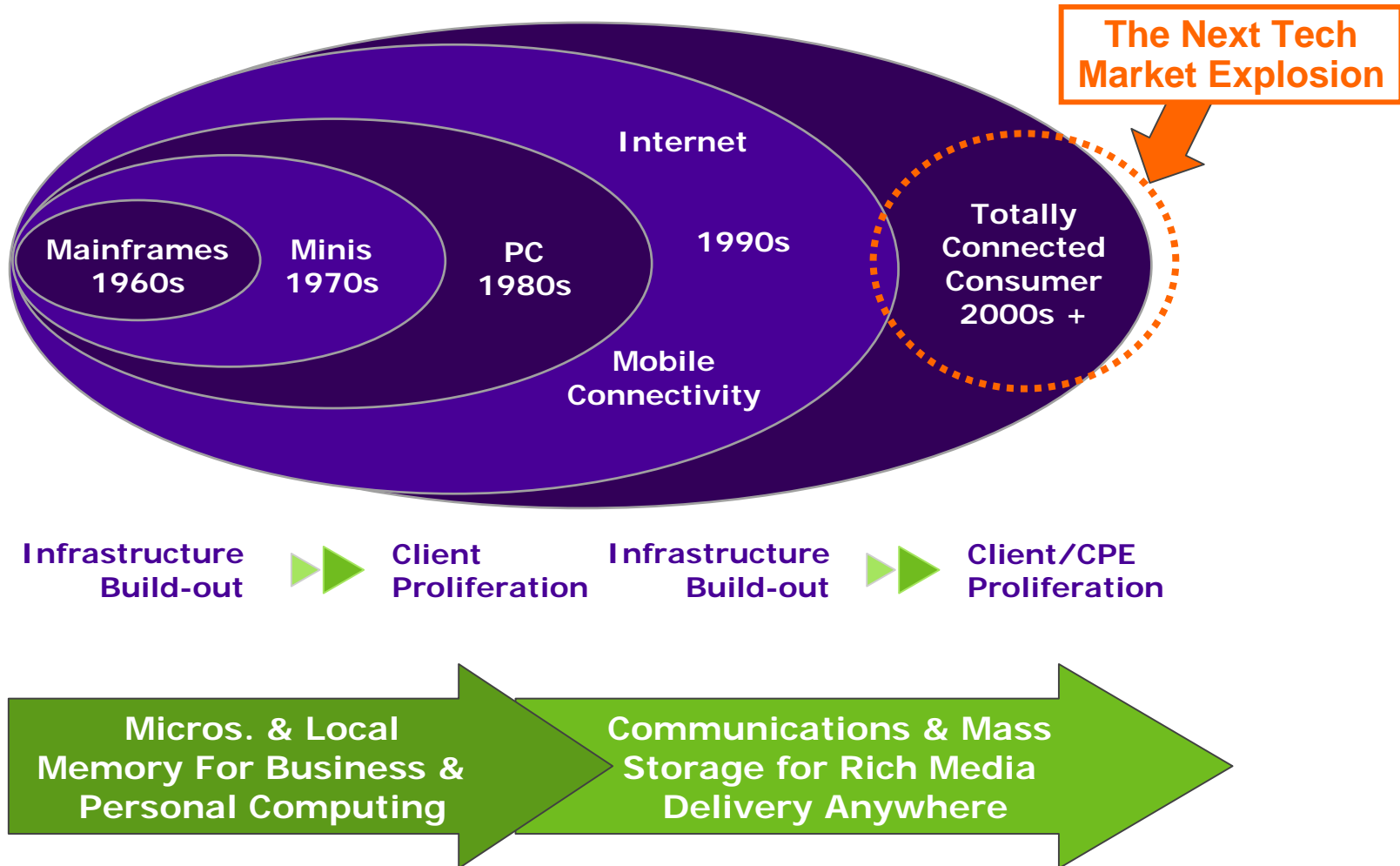
Wireless Base Station Controller



- Reduces OEM development costs
- Shortens time to market
- Enables equipment manufacturing R & D resources to be focused on areas of OEM-level differentiation
- Lowers per-port cost, creating additional value to service providers and consumers

The Next Parade . . .

Tech Market Evolution



Network Vision: Enabling Personal Broadband Through Affordable QoS



What Is Personal Broadband?

Effortless, Global Connectivity

Enabling the movement of voice, pictures, video and documents in any connected environment



Efficient Storage

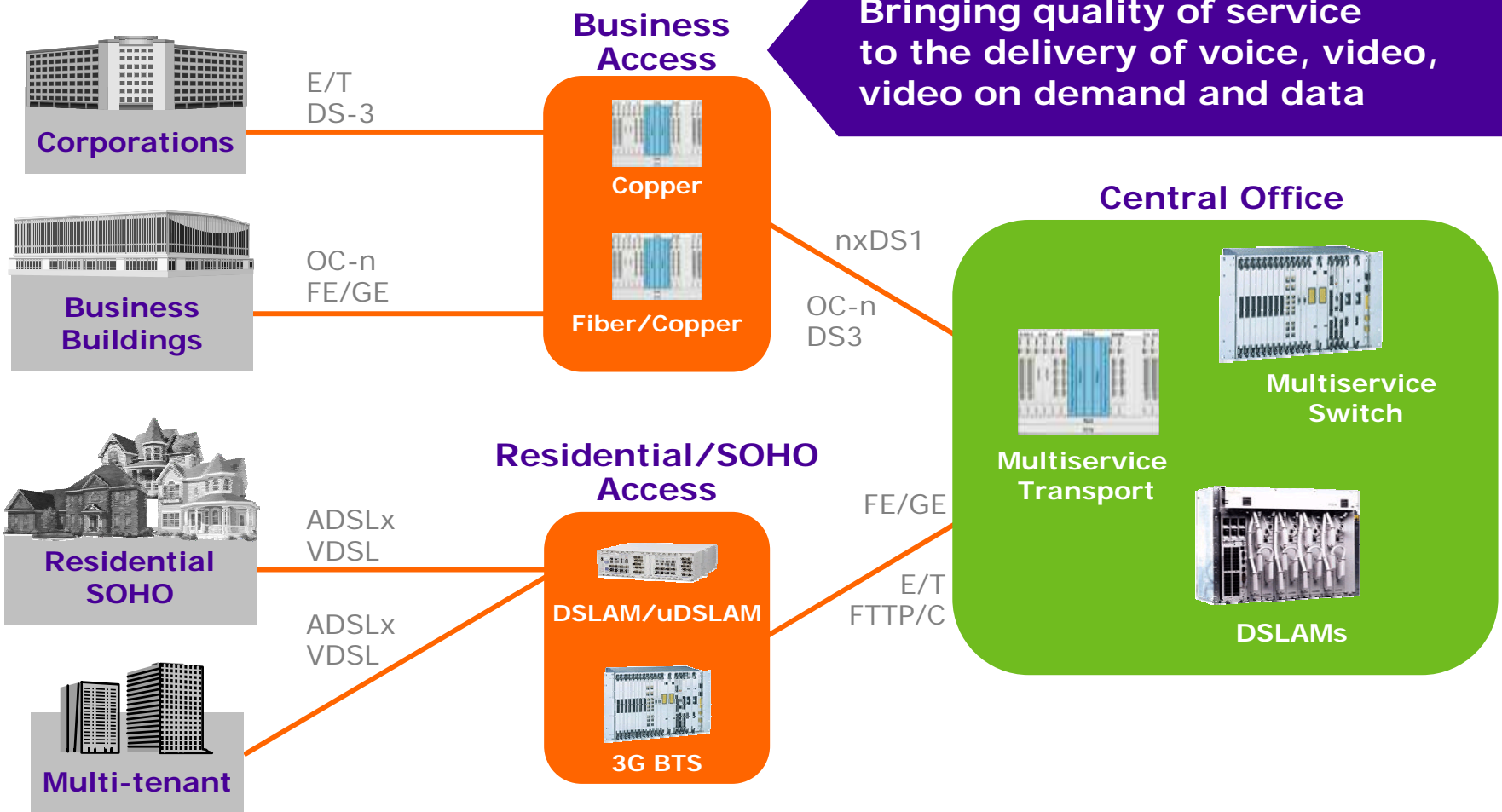
Enabling the storage of voice, pictures, video, and documents locally and on the network

Valued Delivery

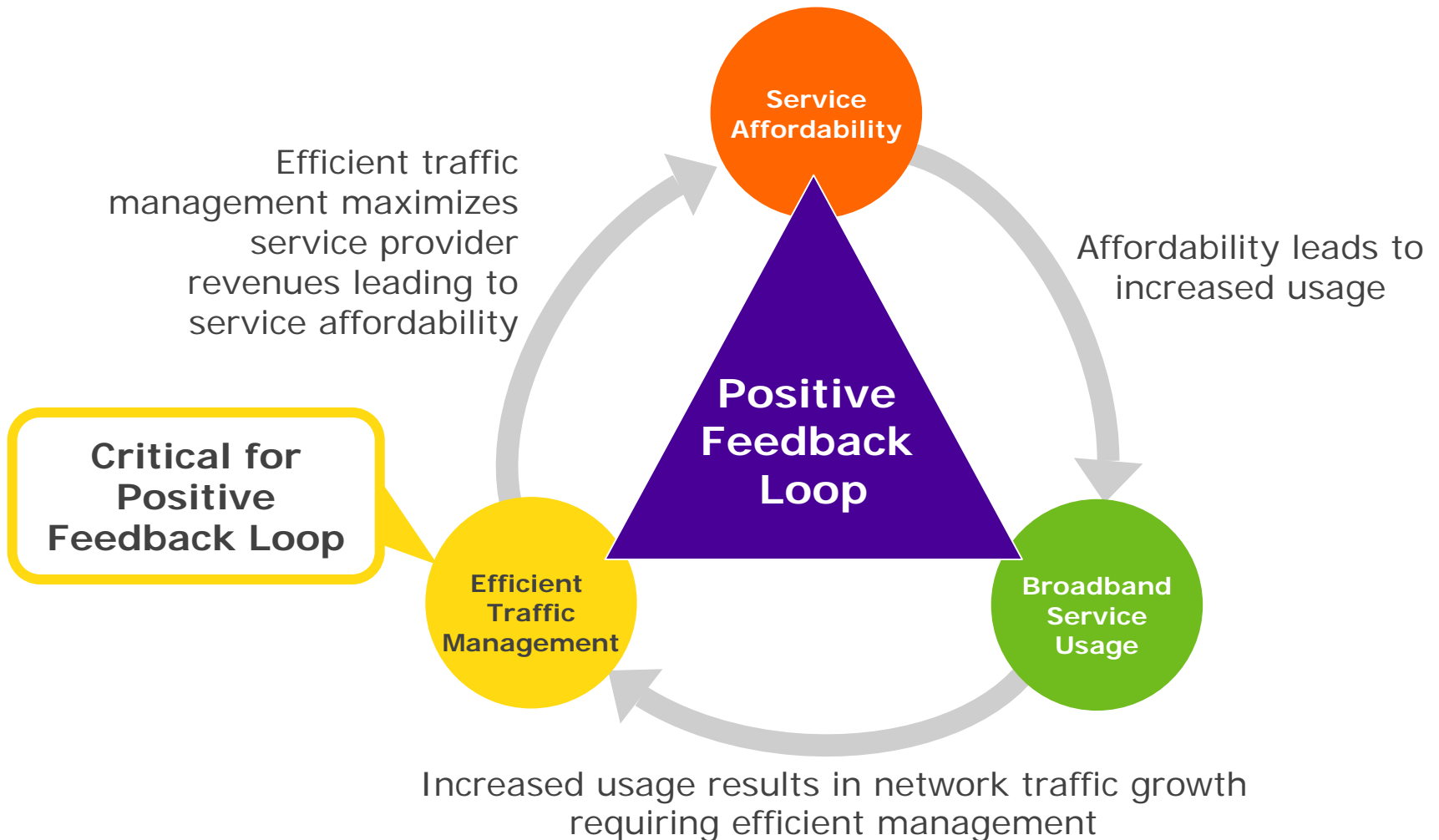
Enabling the delivery of voice, pictures, video, and documents with the needed service and security at the right cost

Enabling Affordable Personal Broadband

Bringing quality of service to the delivery of voice, video, video on demand and data



Affordable Personal Broadband



Growth for Service Providers , Equipment And Component Vendors



Agere Systems Has The QoS Solutions To Meet Your Needs

Please visit our booth to see our QoS Demo