IP Quality of Service (QoS)
Applications and Service Examples

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Introduction

Applications should drive the demands of our IP networks.

Delivering the right amount of bandwidth to the right application within the right time constraints is critical to service & business success.

This presentation provides examples of how QoS functionality available today can be tuned to meet specific application requirements.

QoS required Services

- VPNs
- Video-on-Demand
- Voice-over-IP, Video Conferencing
- Gaming

Requirements for QoS Services

- Tiered Services
  - Guaranteed end-to-end Bandwidth reservation & latency (leased line replacement)
  - Better than best-effort
  - Best effort
- Service Ubiquity (same service, multiple access methods)
- End-to-End Provisioning
- Self-customer service

Bandwidth Evolution has lead to Bandwidth complexity

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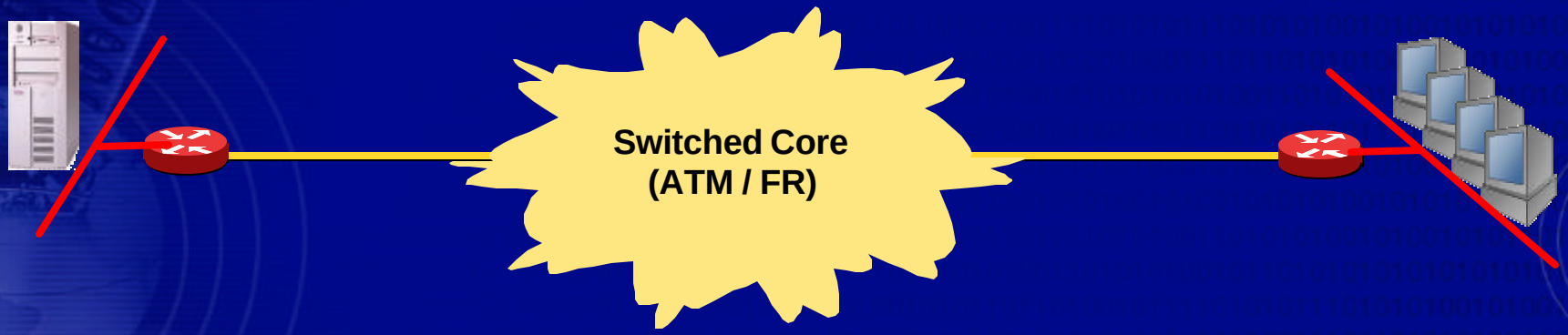

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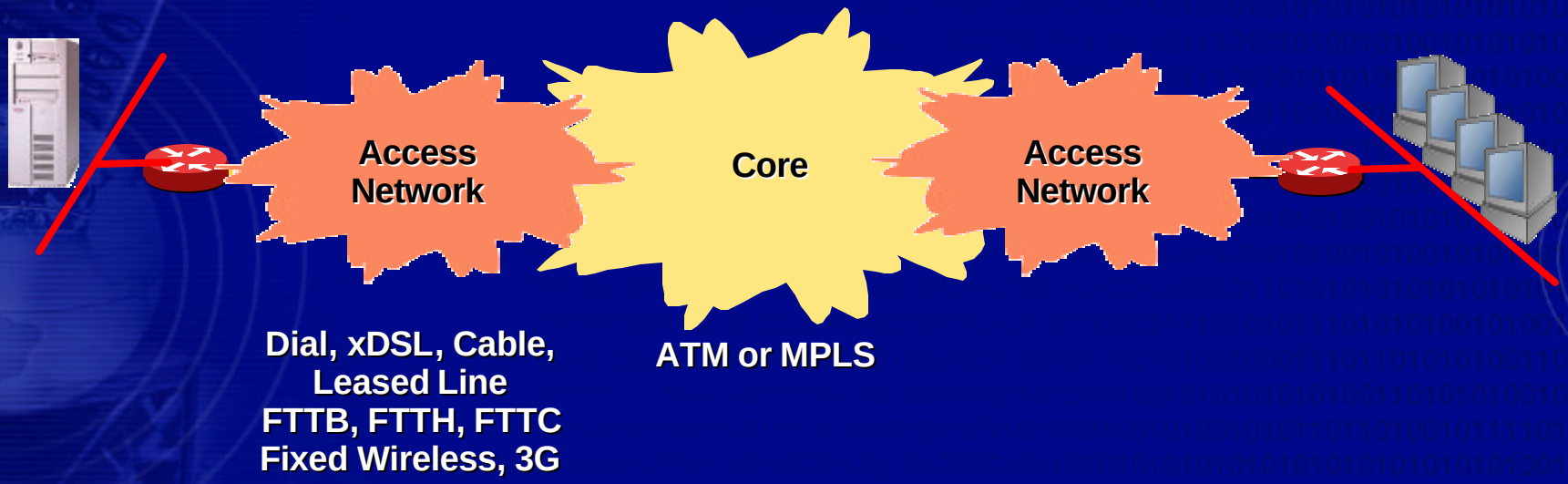
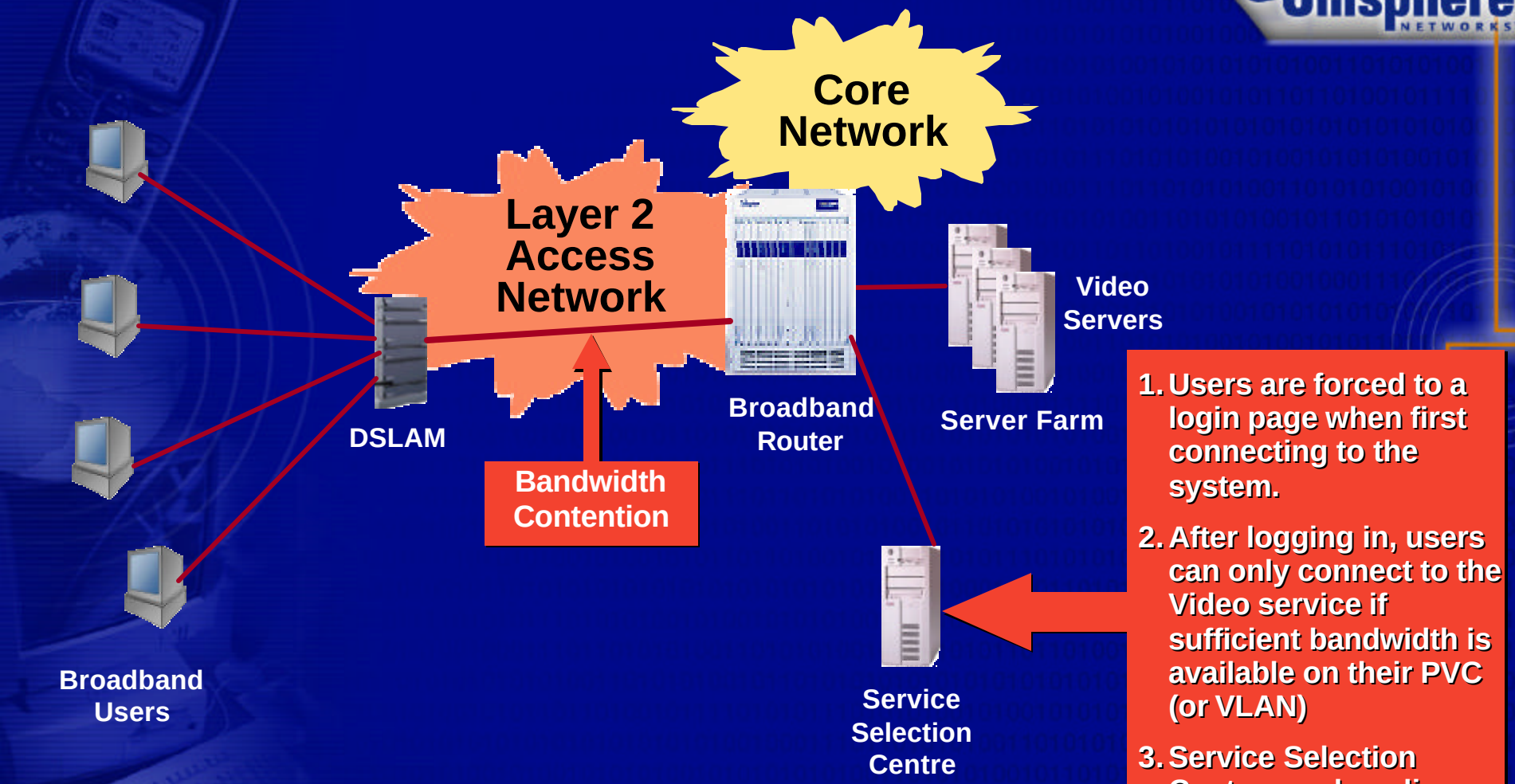


Video-on-Demand Service Delivery

- Problem:
  - Broadband Access Networks are shared
    - (DSL, Cable, Fibre-to-the-building)
    - Service Providers oversubscribe access networks
- Result
    - Bandwidth contention
- Requirement
  - Admission Control for guaranteed bandwidth applications such as Voice, Video
  - Bandwidth reservation and/or prioritisation
- Example
  - Video-on-Demand application on DSL requiring dedicated end-to-end bandwidth to preserve video stream

Bandwidth Reservation at the Edge requires Admission Control

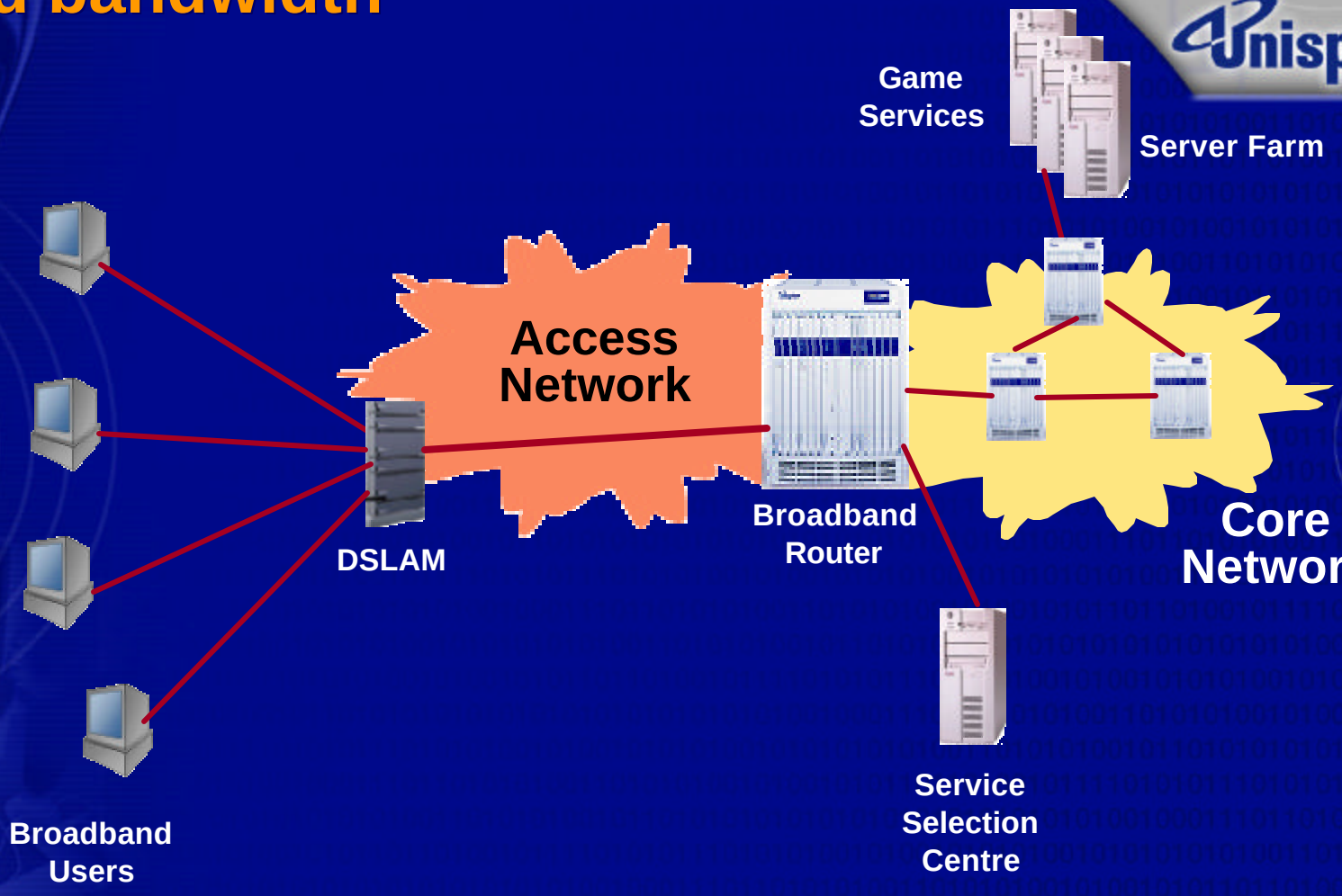


1. Users are forced to a login page when first connecting to the system.
2. After logging in, users can only connect to the Video service if sufficient bandwidth is available on their PVC (or VLAN)
3. Service Selection Centre sends policy routes to the Broadband router

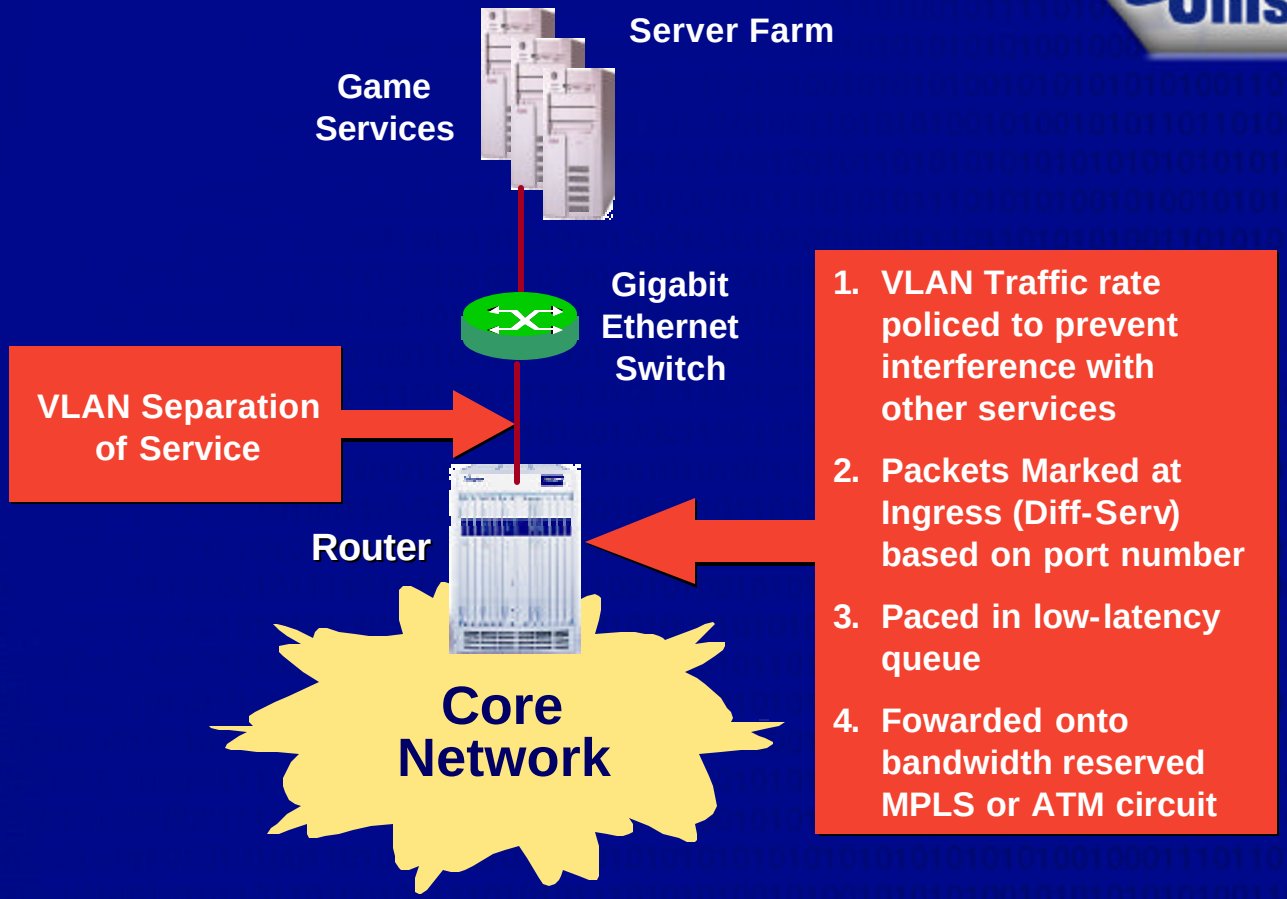
Networked Games Delivery

- Problem
  - Game traffic requires small amounts of low latency traffic to maintain state between players
- Requirement
  - Game traffic should by-pass normal internet traffic across the network to maintain consistent low latency
- Example
  - A Games Server located at an ASP needs to provide same level service for dial, cable and DSL customers.

Low Latency Queuing with shared bandwidth

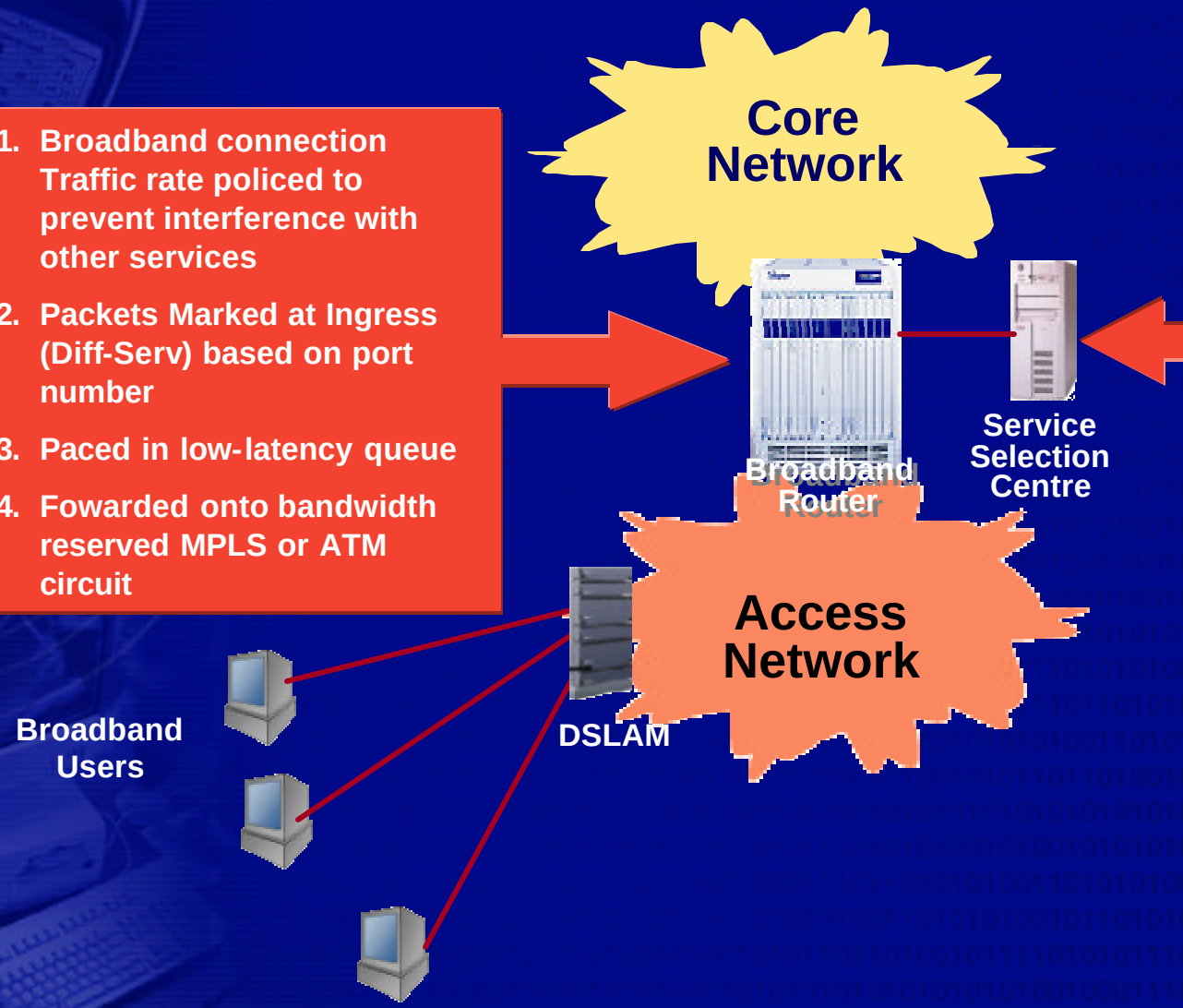


Game Server – Feeding packets into the Core



Low Latency Queuing with shared bandwidth

1. Broadband connection Traffic rate policed to prevent interference with other services
2. Packets Marked at Ingress (Diff-Serv) based on port number
3. Paced in low-latency queue
4. Fowarded onto bandwidth reserved MPLS or ATM circuit



1. Users must log-in through the Service Selection Centre before choosing Game Content
2. Policy Route, IP flow rate, and low latency queue is enabled on the Router through COPS or SNMP.

Summary

- Delivering application focused QoS requires the following:
  - ASIC based wire-rate edge & core routing
  - Core Reservation of bandwidth (ATM or MPLS)
  - Policing and Queue at wire-rate in the edge router
  - Dynamic Control of routing policies per user
    - (through a policy server)
  - Access Network Admission Control