



The need for bandwidth management and QoS control when using public or shared networks for disaster relief work

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When Disaster Strikes!

- Disasters can effect a small area, community, city or even a region
- Emergency response operations go into immediate action
- Effective communications are essential for the emergency response



However, When Disaster does Strike

- Local Infrastructure is affected
- Communications Networks can
 - Fail
 - Performance degradation and unreliability
 - Network saturation and unavailability



Emergency Telecommunications Basic Requirements

Accessibility	Must be accessible from all locations by multiple modes
Network Priority	Must be given priority over non-emergency communications and allow for scalability
Mobility	Must be mobile and re-deployable, must be where it is needed most
Universal Connectivity	Must offer local, regional and international connectivity. Must be interoperable to maximize on all available resources and access points
Security	Must be capable of secure access for the protection, integrity and authentication of data and voice traffic.
Availability	Must be robust, reliable and provide high network availability
Cost Effective	Must be affordable and cost effective.



Emergency Telecommunications Requirements are Changing

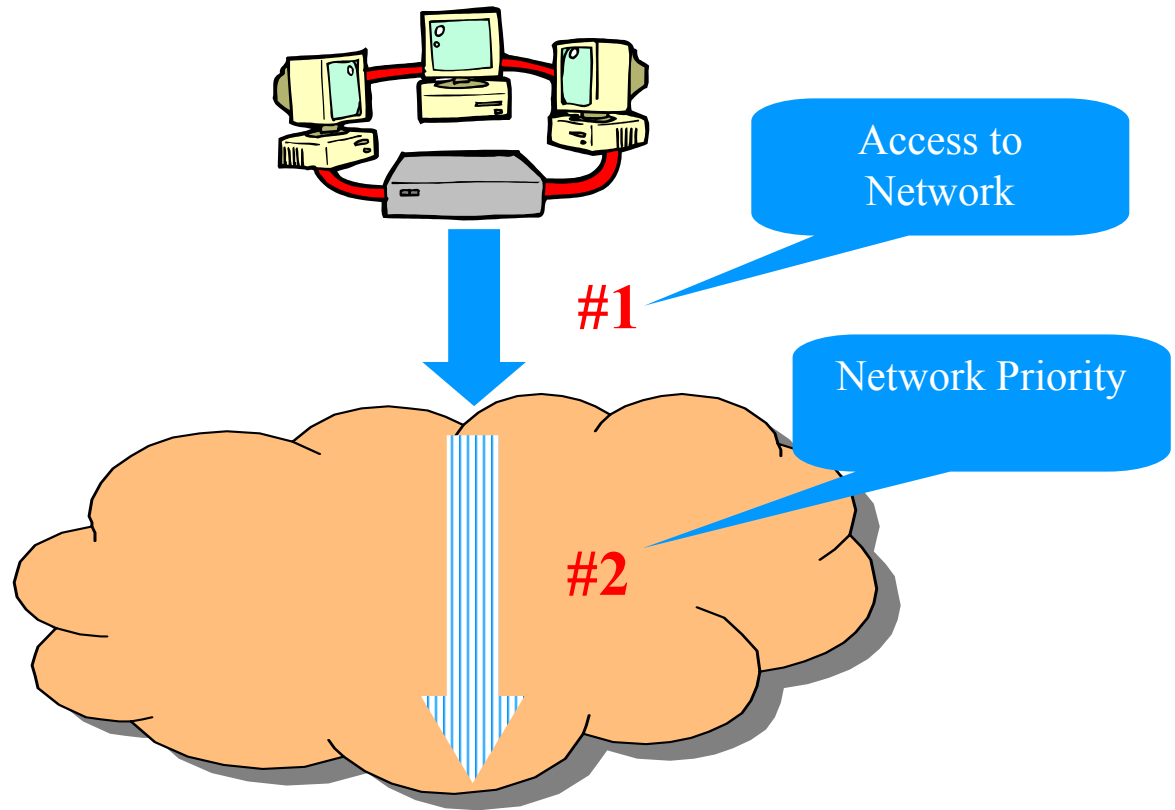
- IP (Internet Protocol) has become the standard for global networking
- Convergence in packet networks is a reality
 - Voice over IP
 - Video over IP
 - Multimedia
 - Internet/Intranet
 - Email
 - Transaction Based Applications



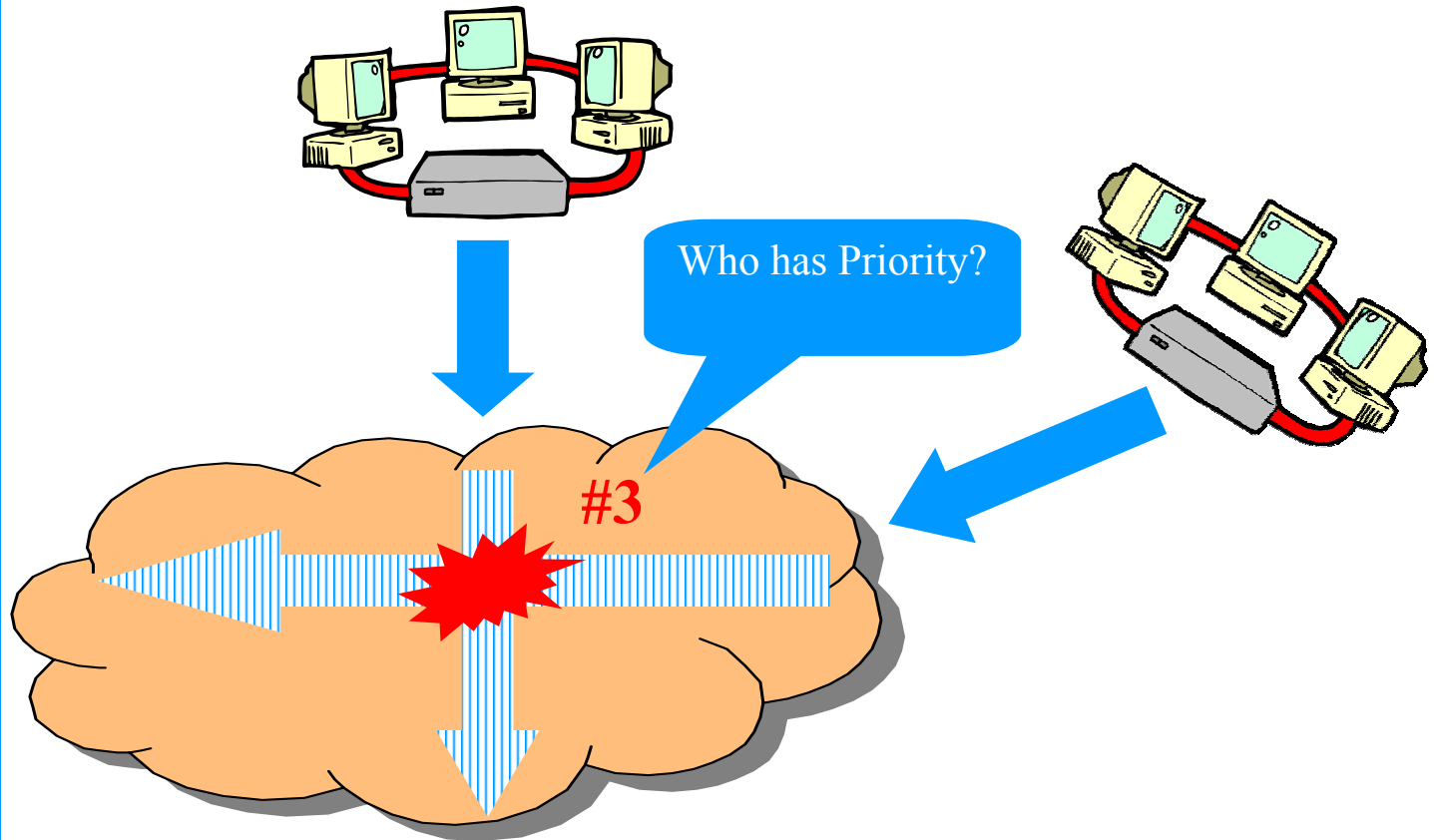
The Challenge

- Having priority access to a network is not enough! The network must have
 - Quality of Service that not only differentiates between users but also for applications and services.
 - Quality of Service that is end-to-end

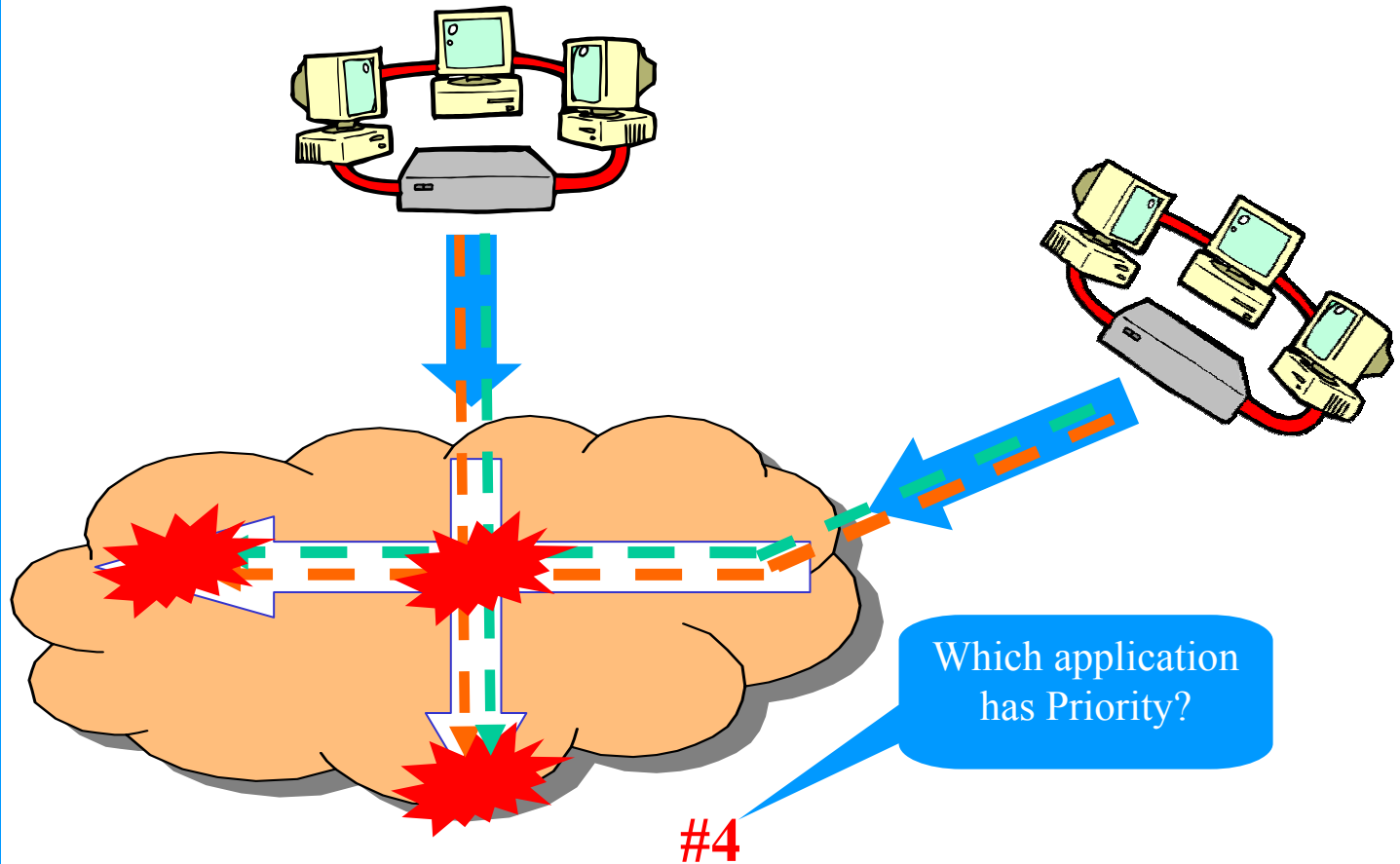
The Problem!



The Problem!



The Problem!





Quality of Service

- Today's networks need to support multiple users with multiple kinds of traffic.
Networks need to:
 - Deliver multiple classes of service
 - Be Scalable - so that network traffic can increase without affecting network performance
 - Support network intensive mission critical applications
- Different kinds of traffic demand different treatments from the network.



Quality of Service Networks

- QoS refers to the capability of a network to provide better service to selected network traffic
- Primary goals of QoS include dedicated bandwidth, controlled jitter and latency, and improved loss characteristics



QoS Service Levels

- Service levels refer to the actual end-to-end QoS capabilities, meaning the ability of a network to deliver service needed by specific network traffic from end to end or edge to edge.
- The services differ in their level of "QoS strictness," which describes how tightly the service can be bound by specific bandwidth, delay, jitter, and loss characteristics.



Bandwidth Management

- *There are many tools and techniques to provide bandwidth management.*
- *The key to bandwidth management is that it must be end-to-end and it must be supported by multiple networks*



Some Tools

- Classification of Traffic
 - Involves classifying traffic at different levels of the OSI 7-layer model:
 - Layer 2 - Ethernet
 - Layer 3 - IP
 - Layer 4 - Well known port number
 - Layer 5-7 - Application specific



Some Tools

Traffic Classification



- Classify packets into traffic classes based on matching of predefined traffic types
- Match against
 - Application type
 - Traffic source or destination



Some Tools

- Traffic Shaping
 - Controls Sending Rate of TCP Source
 - Adjust window size to appropriate value
 - Controls TCP/IP attempts to hog entire pipe
 - Over-speed traffic never reaches the WAN
 - Smooths bursty behavior of TCP
 - Acknowledgements delayed to maintain rate



Some Tools

- o Packet Size Optimization
 - Controls the size of TCP packets that enter the network
- o Queuing
 - Class Based Queuing
 - Weighted Fair Queuing
 - Custom Queuing
 - Priority Queuing
 - Class Based Weighted Fair Queuing



Some Tools

- TOS Marking
 - Marks packets for IP precedence and Diffserv
- Session bandwidth control
 - protect individual TCP and UDP sessions
 - guarantee session bandwidth



Summary

- With the increased usage and dependence of global packet-based networks and the convergence of voice, video and data; disaster relief operations require not only the prioritization of emergency access across networks, but also require the prioritization and classification of traffic by user and application.
- Quality of Service needs to be supported across all networks to provide a true end-to-end service.



UNICEF Global IP Network

- Fully managed and secure data network service with guaranteed bandwidth for every location
- Multi-Service IP network supporting Voice, Video, Fax and Data
- QoS is ensured end-to-end
- Over 170 locations connected and managed



UNICEF Network Architecture

- Two Basic Networks
 - Private IP VPN
 - MPLS Core
 - IP VSAT (Very Small Aperture Terminal)
 - DAMA Based



UNICEF QoS

- o Dedicated QoS devices at the edges (bottlenecks) of the network
- o Router QoS used within the network to ensure end-to-end
- o Centralized policy management
- o Predictable performance has been achieved for applications and services (VoIP and Video)