SNS College of Technology

Department of Information Technology

19CSB302-COMPUTER NETWORKS

UNIT-4 APPLICATION LAYER

QOS

K.S Mohan ,AP/I

SNSCT

Best-Effort Service

The best-effort service refers to a single service model, also the simplest one. According to the service model, the application can send any number of packets at any time without permission or notification of the network. Then, the network transmits the packets with the best effort, but without ensuring performance in aspects of delay and reliability. The best-effort service is the default service model for Internet and is applicable to most network applications, such as FTP and email.

Technical usage: The best-effort service is based on first-in-first-out (FIFO) queuing.

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Integrated Service

A controllable and end-to-end service is provided to applications.

The network unit supports the control mechanism based on QoS.

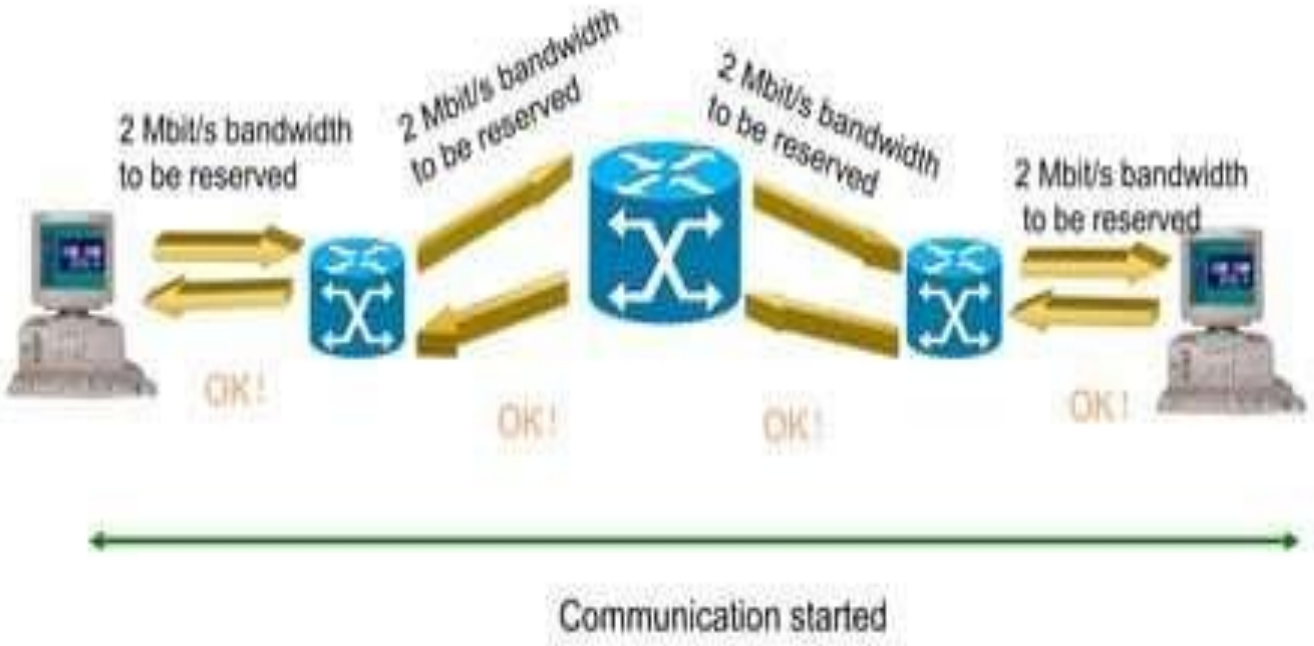
Applications apply fro certain QoS service from the network.

The signaling protocol deploys QoS requests on the network.

The major signaling protocol is RSVP.

- **Technical usage: RSVP**

Schematic Diagram of RSVP



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Differentiated Service

Objective:

In the case of network congestion, flow control and forwarding are differentiated according to service priorities to solve the congestion problem.

Method:

The relative priority mechanism is adopted to classify and forward information flows with difference, and thus to balance service quality and network congestion.

Principle:

1. When entering a DiffServ network, the service flows are aggregated by DiffServ code point (DSCP), Pri, or Exp as behavior aggregates (BAs).
2. The DS node adopts specific behaviors for certain BAs and performs per-hop behavior (PHB) according to DSCP, Pri, or Exp in the packet head. There are three types of PHBs:
   - . Expedited forwarding (EF)
   - . Assured forwarding (AF): four classes
   - . Best effort (BE)

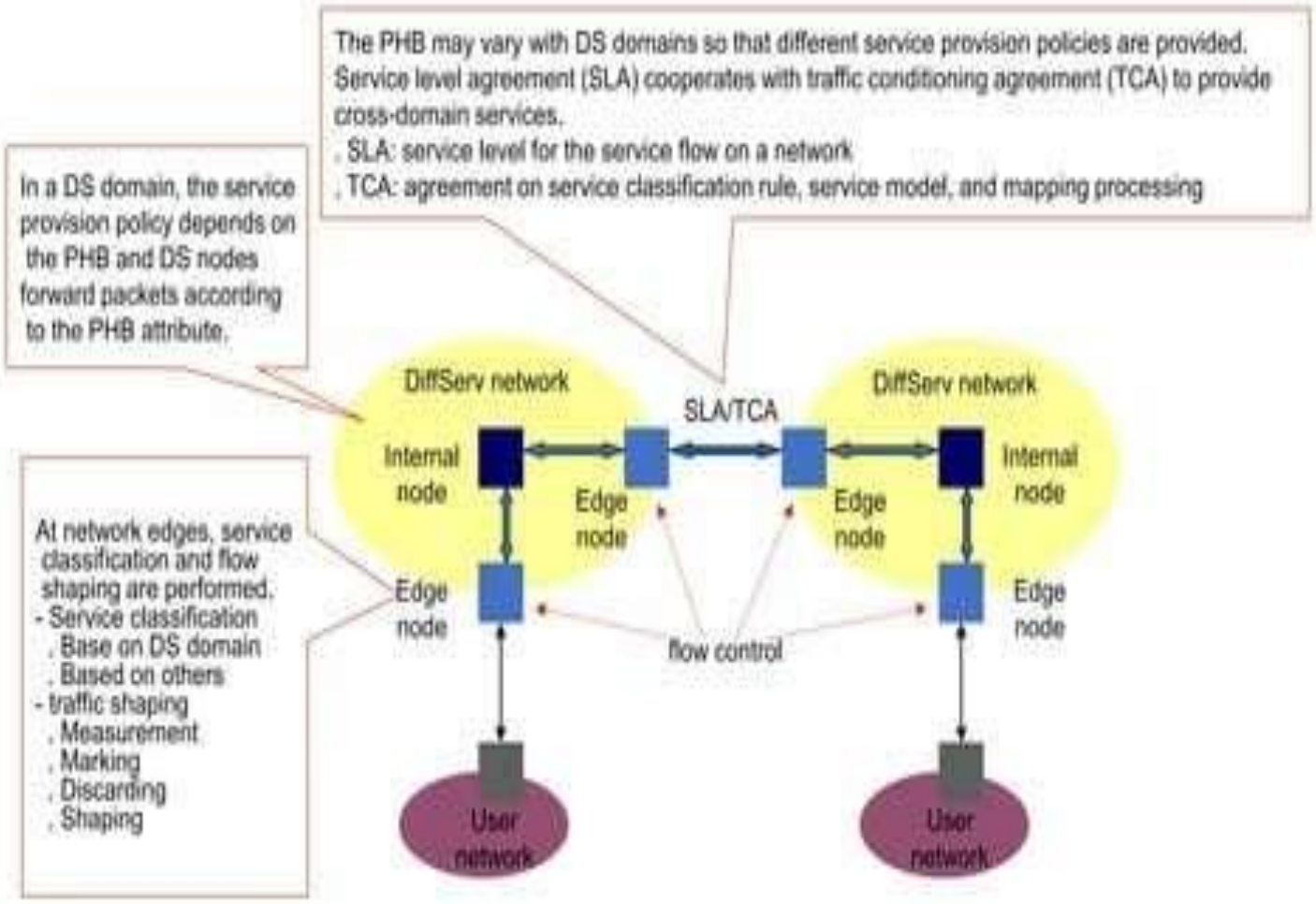
Basic Concepts Related to DiffServ

Term	Description
DS domain	DS domains identify different service classes. The service standard for a domain is the same.
Edge node	An edge node refers to a node at the edge of a DS domain.
Internal node	An internal node refers to a node inside the DS domain.
PHB	PHB refers to the forwarding behaviors conducted by the equipment to the DS domains when the data flows through the equipment that supports DS.
SLA	SLA refers to a protocol reached by the user and service provider, and defines the supported service types and service volume for each service type. The user can be an ordinary user or a service provider.

PHB Service Class and Service Quality

PHB Service Class	PHB Service Quality
BE	Best-effort service model: This model is the default service model for Internet and is based on the FIFO technology. Packets are forwarded with the best effort with the default PHB and DSCP of "000000".
AF1 AF2 AF3 AF4	The AF behavior is applicable to key data with ensured bandwidth and low delay. The traffic can exceed the specification. If the traffic does not exceed the specification, the forwarding quality must be ensured. If the traffic does not exceed the specification, the extra traffic is not forwarded, but is forwarded with a lower service level. For each AF class, there are three different discard priorities (color). For example, AF1 can be further classified as follows: ▫AF11: green priority. The traffic of this class can normally pass. ▫AF12: yellow priority. The packets of this class are discarded in case of congestion. ▫AF13: red priority. The packets of this class are discarded at first.
EF CS6 CS7	The rate of the traffic sent by any DS node must be minimum the specified rate in any condition. Then, the forwarding effect of a virtual lease line is emulated to provide a forwarding service with a low packet loss rate, low delay, and high bandwidth. Hence, these PHB service classes are applicable to video services and VoIP services. CS indicates code selection. The service class is the same as IP precedence and the DSCP value is "XXX000".

Architecture of the DiffServ Model



DiffServ

- In the case of DiffServ, the equipment at edges performs complex flow classification and flow control. Specifically, the equipment at edges mainly performs complex flow classification, marks packets with DSCP, monitors the flow access rate, and controls access. The internal equipment in a domain only needs to perform simple flow classification and to perform flow control for the same class of flows.
- This avoids per-flow complex flow classification and flow control in the IntServ model. In this manner, the differentiated forwarding behaviors are effectively realized inside the network. That is, traffic monitoring and traffic shaping are performed by the equipment at edges of a DS domain.