8.14. ATM QUALITY OF SERVICE (QOS)

As a matter of fact, ATM provides the transmission technologies, transmission rates, and quality of service (QoS) required of all present-day network applications and functions. The ATM supports a guaranteed quality of service (QoS) which includes,

(i) Traffic contract; (ii) Traffic shaping; (iii) Traffic policing

Traffic contract

A traffic contract specifies an envelope which describes the intended data flow. It also specifies the values of peak and sustained bandwidth, burst size etc. When one ATM system gets connected to an ATM network, it automatically enters into a contract based on QoS parameters.

Traffic shaping and traffic policing

Traffic shaping is done in order to fit the traffic within the promised envelope. It uses the queues to constrain the data bursts, limit the peak data rate and reduce jitters. The ATM switches can be used to measure the actual traffic flow, and compare it with the agree upon traffic to enforce the contract. If the actual traffic is higher than the agreed upon traffic, then the switch will set the cell loss priority (CLP) bit. When this bit is set, the cell discard becomes eligible and any switch handling the cell is allowed to discard that cell in the event of congestion.

ATM signaling and connection establishment

When an ATM device wishes to establish a connection with another ATM device, it sends request via a signaling packet to its ATM switch. The request envelope contains the following :

(i) Address of desired ATM endpoint

(ii) QoS parameters.

EXAMPLE 13.2. Select suitable values of *A*, *B*, *N*, *D* and *E* and demonstrate the encryption and decryption procedures used in RSA algorithm.

Solution :

(i) First, let us select *A* and *B*.

Let the two prime numbers *A* and *B* be as under :

$$A = 11, \quad B = 23$$

(ii) Then, we evaluate N and T.

$$N = A \times B = 11 \times 23 = 253$$

$$T = (A - 1)(B - 1) = 10 \times 22 = 220.$$

(iii) Then, we evaluate D and E.

E(public key) should not have any factor other than 1 in common with T i.e. 220.

Thus, $220 = 2 \times 2 \times 55 = 2 \times 2 \times 5 \times 11$

Hence, we can select $E = 3$

Now, we evaluate D(private key) with the help of following expression :

$$D = E^{-1} \bmod T$$

Therefore, $D = 3^{-1} \bmod 220$

Now, D can be calculated as under :

Next, we find the (multiple of 220 + 1) which is divisible by 3. Then, we divide that number by 3 and select the quotient of this division as *D*.

Therefore, $(220 \times 1) + 1 = 221$ not divisible by 3

$(220 \times 2) + 1 = 441$ it is divisible by 3.

Therefore, $\dfrac{441}{3} = 147$

or $D = 147$

(iv) Now, let us carryout encryption.

Let the letter 1 is to be sent.

Therefore, Plaintext $M = 9$, as *F* is the ninth alphabet.

Hence, Ciphertext $C = M^E \bmod N$

or $C = 9^3 \bmod 221$

Hence, $C = 729 \bmod 221$

or $C = \dfrac{729}{221}$

$Q = 3$ remainder $= 66$

Therefore, Ciphertext $C = 66$

This number is sent to the receiver.

(v) Finally, let us carryout decryption.

Plaintext $M = C^D \bmod N = 66^{147} \bmod 221 = 9$.

Thus, the original number is obtained.