

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester I

Date: 6 October 2005

Subject: 240-460 Broadband Integrated Networks

Academic Year: 2005

Time: 09.00 - 12.00

Room: R200

- In this exam paper, there are 2 parts. Please separate your answers sheet for each part.
- In part 1, there are four questions. In part 2 there are 4 questions.
- All notes and books are not allowed,
- Answers could be either in Thai or English,
- calculator is allowed,
- Answer all questions.

PART 1

1. Please describe the following terms and definitions clearly (20 Marks):

- 1.1 ATM Forum
- 1.2 The source traffic descriptor of VBR
- 1.3 B-ISDN
- 1.4 Public UNI/Private UNI
- 1.5 Cell delineation
- 1.6 VCI/VPI
- 1.7 CS and SAR sub-layer in AAL
- 1.8 Rate Based Flow Control
- 1.9 Credit Based Flow Control
- 1.10 The cell delay variation (CDV) tolerance

2. ATM technology is employed to carry voice and video traffic for both fixed-wire and wireless networks, so called VTOA (Voice and Telephony over ATM)

2.1 **Figure 1** shows a typical structured circuit emulation applications using AAL-1 service in ATM network (10 Marks).

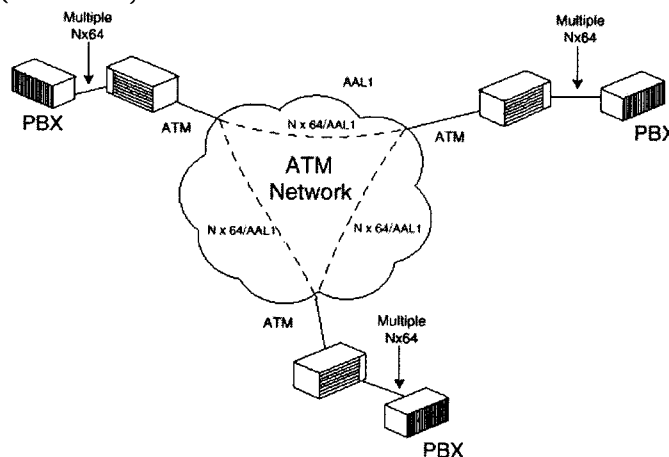


Figure 1 TYPICAL STRUCTURED CIRCUIT EMULATION APPLICATION

- a) State the service that provided by AAL-1
- b) What are the limitations of this service?

2.2. In AAL-2 service with multiplexing scheme, a number of voice channels can be multiplexed into one VC/VP (10 Marks).

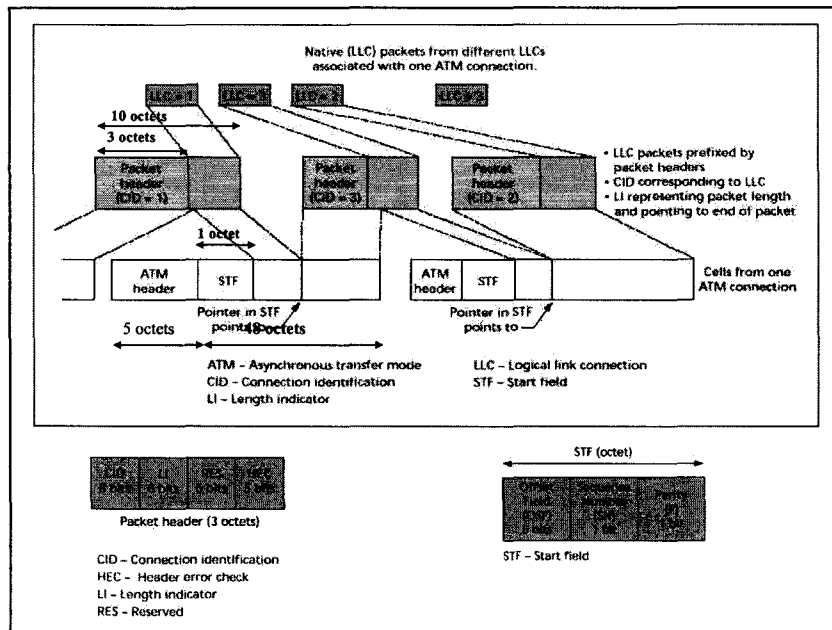


Figure 2 Voice frame format of AAL-2 with multiplexing capability

Figure 2 shows voice frame format of AAL-2 when voice channels are multiplexed into a single VC/VP. Please determine the overhead of this service (from voice frame layer to ATM layer, you have to show your calculation).

3 (20 Marks) It can be shown that VBR traffic can be policed by two Generic Cell Rate Algorithm (GCRA) inspecting the cell flow in parallel:

- the first GCRA verifies of the conformance of the peak cell rate (PCR),
GCRA1 [$T=T(PCR), \tau=\tau(PCR)$]
- the second GCRA verifies the conformance of the sustainable cell rate (SCR)
GCRA1 [$T=T(SCR), \tau=\tau(SCR)$]

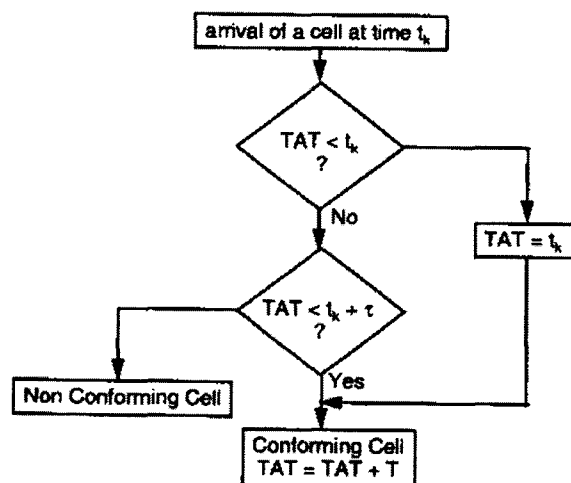


Figure 3 Generic Cell Rate Algorithm (GCRA)

If the VBR traffic stream, as shown in Figure 4, enters the system which has the following VBR traffic contract parameters:

$T(PCR) = 1$ cell time, $\tau(PCR) = 0$ cell time, $T(SCR) = 3$ cell time, $MSB = 3$ cells, $\tau(SCR) = 4$ cell time.

All traffic conformant to $GCRA(1,0)$, $GCRA(3,4)$ have to be verified. Please indicate each non-conformant/conformant cell clearly. You need to show that why each cell receive such status.

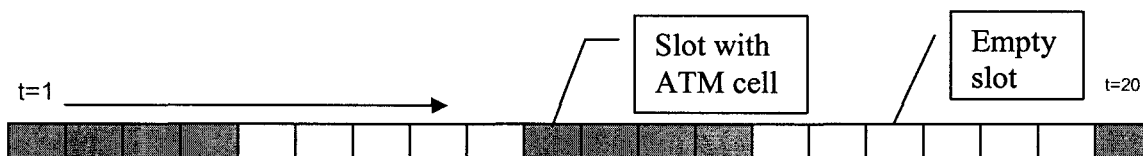
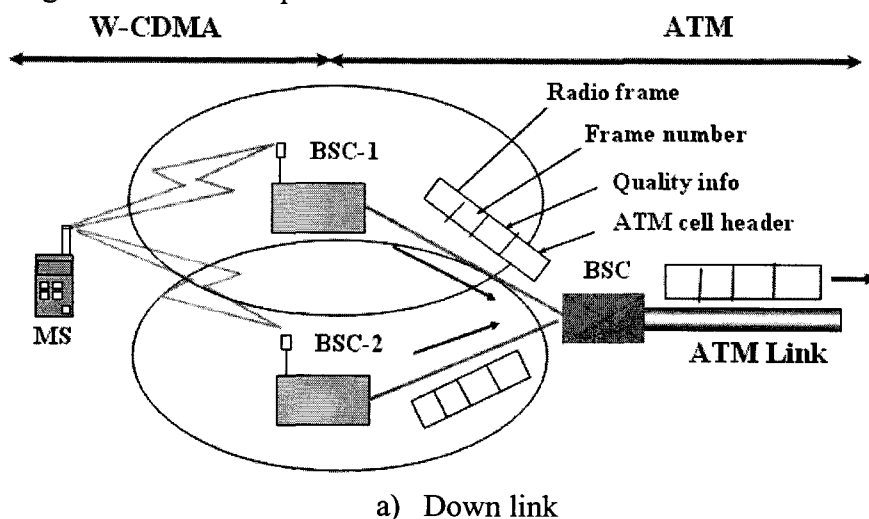


Figure 4 VBR traffic stream and its time slots

- t=1 : _____
- t=2 : t + τ = 6, conforming TAT = 7 <- 4+3 _____
- t=3 : _____
- t=4 : _____
- t=10 : _____
- t=11 : _____
- t=12 : _____
- t=13 : _____
- t=14 : _____
- t=20 : _____

4. Applying ATM for 3rd Generation Mobile Phone System. Figure 5 shows applying ATM technology for 3rd generation mobile phone.



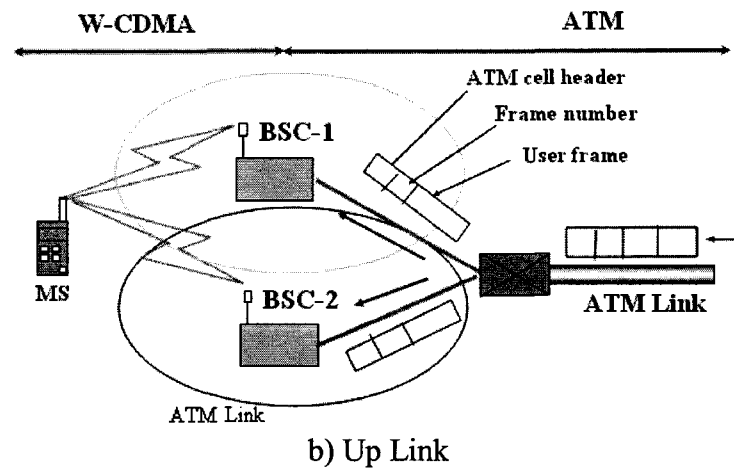


Figure 5 Applying ATM as a switching technology for 3rd generation mobile phone

- (a) Explain how ATM switches in Figure 5 work. (5 Marks)
- (b) How does ATM help the improvement of the network operation in terms of efficiency, reliability, and quality of service? (5 Marks)

