PRINCE OF SONGKLA UNIVERSITY FACULTY OF ENGINEERING

Final Examination: Semester I

Academic Year: 2005

Date: 6 October 2005

Subject: 240-460 Broadband Integrated Networks

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
- 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).

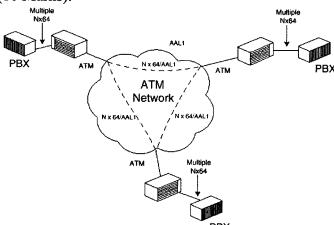


Figure 1 TYPICAL STRUCTURED CIRCUIT EMULATION APPLICATION

- 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).

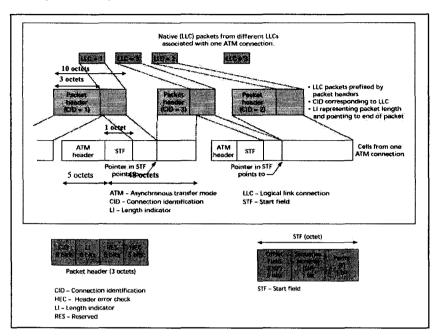


Figure 2 Voice frame format of AAL-2 with multiplexing capability

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), $\tau=\tau(SCR)$]

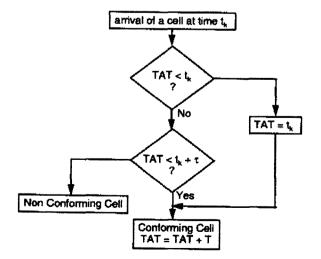


Figure 3 Generic Cell Rate Algorithm (GCRA)

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

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

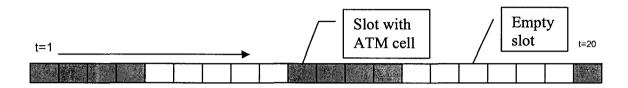
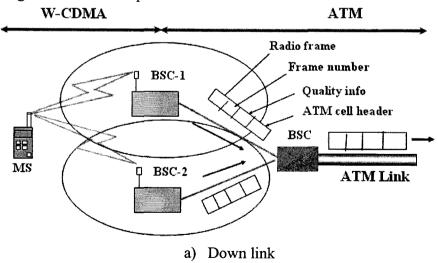


Figure 4 VBR traffic stream and its time slots

t=1:			
t=2:_t+1	$\tau = 6$, conforming TAT	C = 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.



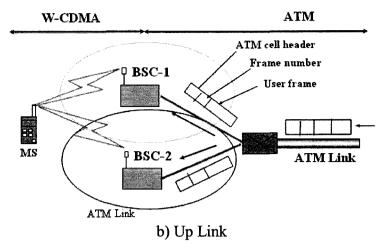


Figure 5 Applying ATM as a switching technology for 3rd generation mobile phone

- (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)

Student Name	Student ID

Part 2

- There are 3 questions in part 2,
- Please write your answers in this sheet. You may use double side of this paper if the provided areas are not enough.
- 1. Figure below, Figure 6, shows how each end-terminal communications to each other via voiceband modems and PSTN. There are 5 stages shown in the figure.

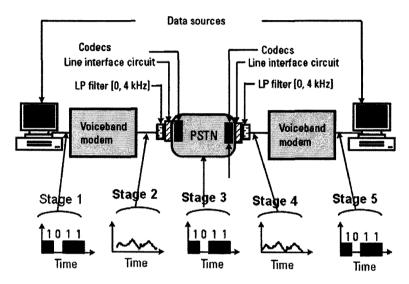


Figure 6 Principle of voiceband modem

a. What is LP (Low Pass Filter) used for? (5 marks)

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	b.	Please describe each stage from 1 to 5 (how it works), (note that, in the figure, there are CODEC and Line Interface Circuit) (5 marks)
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- 2. Figure 7 shows a configuration of an ADSL access model. Explain the following items:
 - a. Why do we need 'POST splitters' and How does it work? (3 marks)
 b. What are the functions of 'ATU-C' and 'ATU-R'? (3 marks)
 c. What are advantages and disadvantages of ADSL? (4 marks)

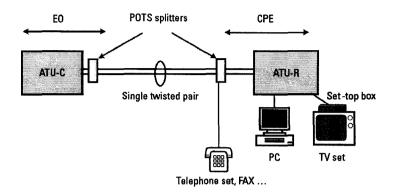


Figure 7 Configuration of an ADSL access.

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- 3. Figure 8 shows a splitterless ADSL or G. lite configuration model.
 - a. How does this system work? (5 marks)
 - b. What are advantages and disadvantage of this system (if compare with ADSL)? (5 marks)

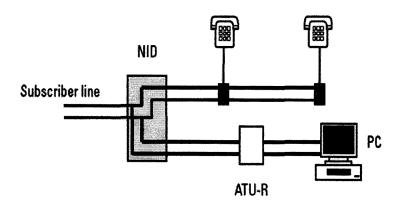


Figure 8 In-home cabling system for splitterless ADSL (G.lite)