Base Station Transmission in UMTS Network

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- Background
- Methodology
- Problem
- Results and author’s contribution
- Conclusions and future work

Background

- GSM transmission based on PDH
- Timeslot/TRX allocation
- A more flexible technique needed
- Release99: ATM, AAL2
- Co-siting
- Capacity enlargement

Methodology

- Mainly literature
- Lack of operational networks
- Planning process from operator’s point of view

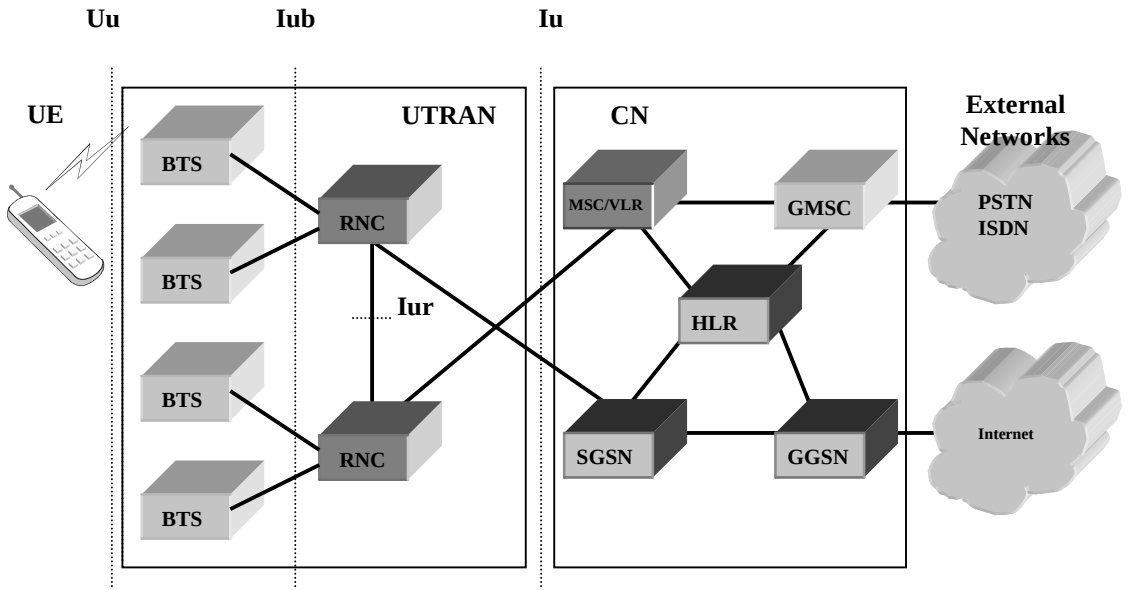
Problem

- Timeslot allocation in GSM base station transmission
- More flexibility is needed: no more fixed bandwidth connections per transceiver unit
- ATM and AAL2: low-bit-rate, delay sensitive, short packets
- Demand for fast connection establishment and release (soft handover)

timeslot	bits 1 2	3 4	5 6	7 8
64k	16k	16k	16k	16k
1	O&M	TRX1	TRX2	TRX3
2	P0	P1	P2	P3
3	P4	P5	P6	P7
4	P0	P1	P2	P3
5	P4	P5	P6	P7
6	P0	P1	P4	P5
7	P4	P5	P6	P7
8	TRX4	TRX5	TRX6	TRX7
9	P0	P1	P4	P5
10	P4	P5	P6	P7
11	P0	P1	P2	P3
12	P4	P5	P6	P7
13	P0	P1	P2	P3
14	P4	P5	P6	P7
15	P0	P1	P4	P5
16	P4	P5	P6	P7
17	TRX8	TRX9	TRX10	TRX11
18	P0	P1	P4	P5
19	P4	P5	P6	P7
20	P0	P1	P2	P3
21	P4	P5	P6	P7
22	P0	P1	P2	P3
23	P4	P5	P6	P7
24	P0	P1	P4	P5
25	P4	P5	P6	P7
26	TRX12	-	-	-
27	P0	P1	P4	P5
28	P4	P5	P6	P7
29				
30				
31				

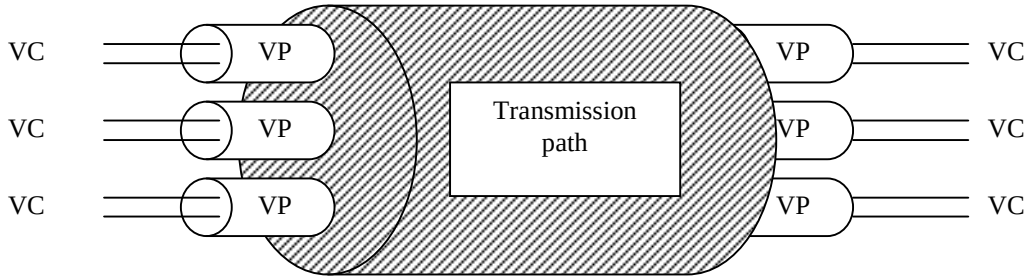
Timeslot allocation in GSM

ATM traffic in Iub



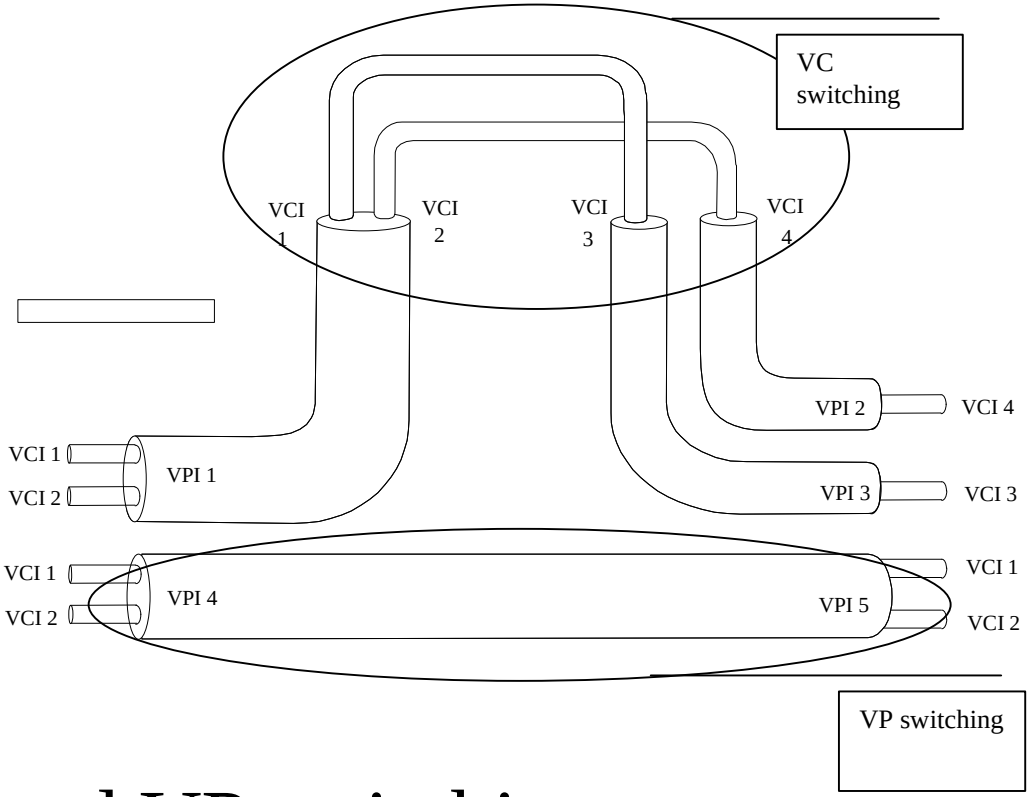
- PDH or SDH

ATM traffic in Iub



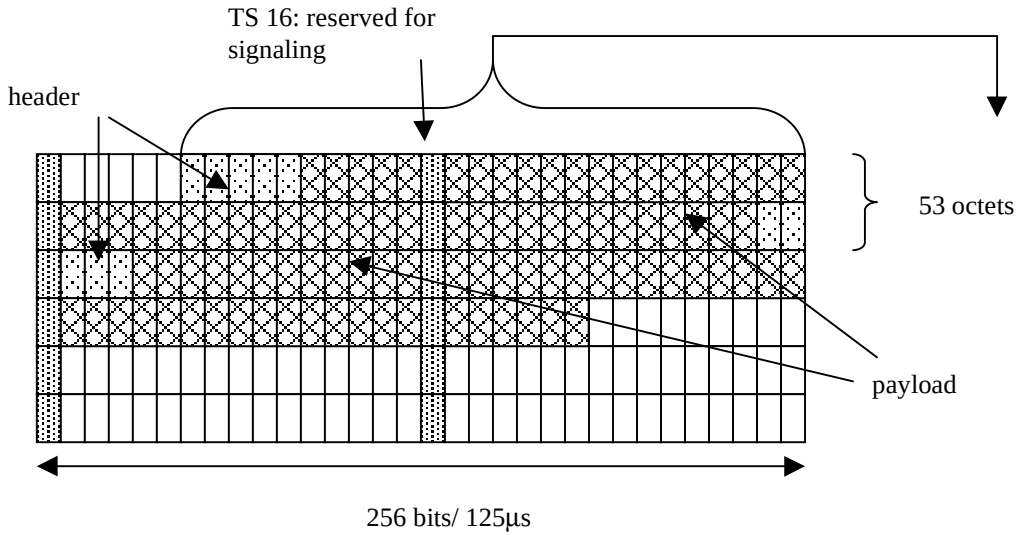
- The relation between transmission path, VP and VC

ATM traffic in Iub



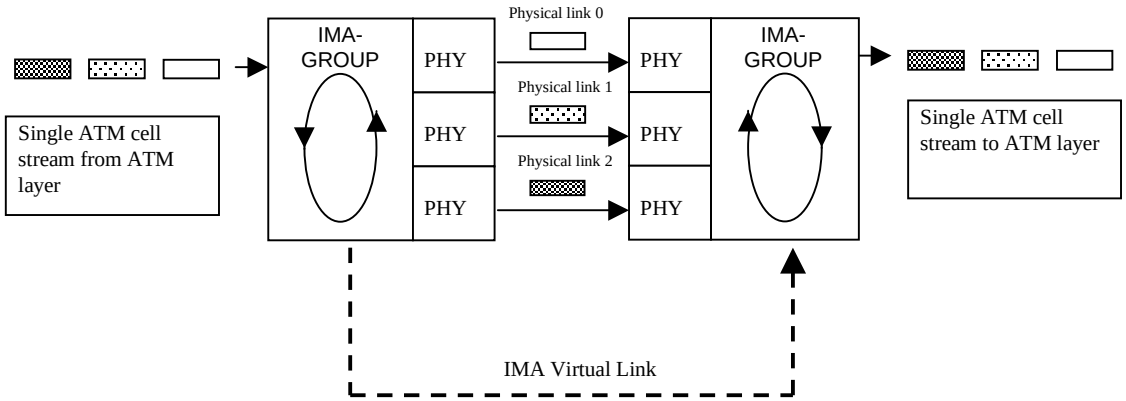
- VC and VP switching

ATM traffic in Iub, E1



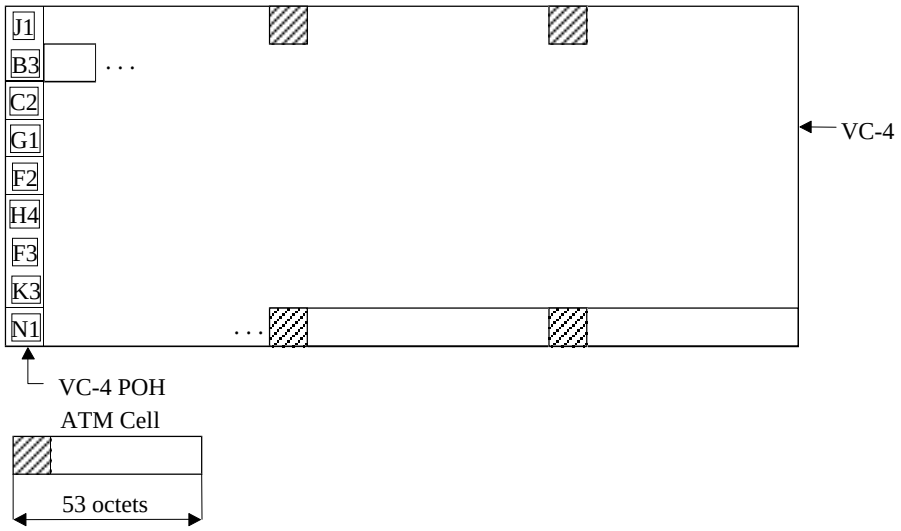
- ATM cells mapped into 2Mbit/s connection, PCR=4528 cells/s (30ts used)

IMA in Iub



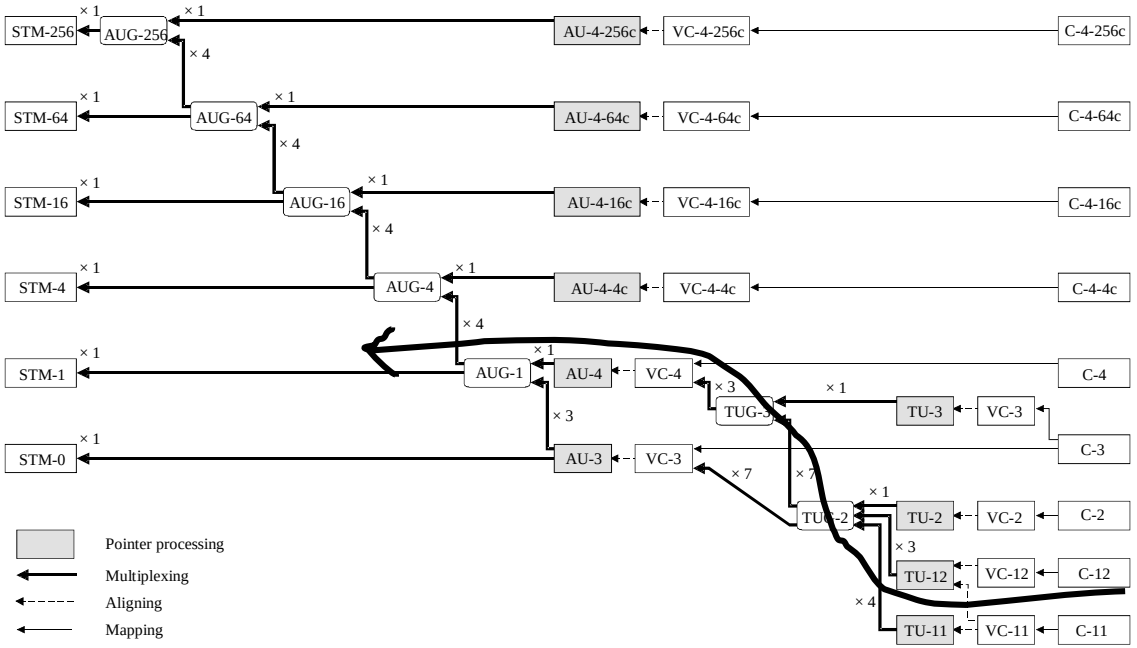
- Several E1s combined to form one larger connection

ATM traffic in Iub, STM-1



- ATM cell mapping into STM-1 VC-4

Iub: SDH, PDH and ATM



- STM-1 VC-12

External ATM network

- Efficient bandwidth usage
- Minimize costs
- Operation and maintenance
- Addressing
- Adoption remains to be seen

Hub site

- Concentration of traffic
- Several E1s can be combined to form a larger connection
- Several larger connections can be combined to for one STM-1 VC-4
- Fault situation

Results and author's contribution

- Based on planning process, E1s in Iub will be enough for a while => IMA is adopted
- STM-1 for every base station is not reasonable at the moment
- No general solution exists, depends on operator's network topology

Conclusions and future work

- Base station transmission is in turning point
- ATM is used now, IP is expected in the future
- All-IP concept with different RAN will have an impact on both transmission and base stations
- Investments should be moderate and if possible also future proof