

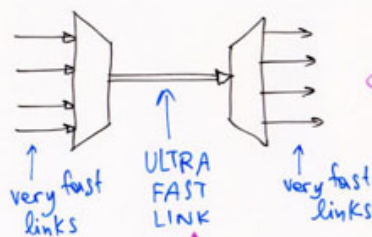
4.1 Space Switching, The Crossbar, Time-Space-Time (TST) Switching, and the (Static) Crossbar Scheduling Problem

- Space Switching
 - there is no single “point” where all traffic passes through
- The Crossbar
 - a space switch where every output independently selects any input
- Time-Space-Time (TST) Switching
 - a crossbar, time-multiplexed among several sets of connections
- The Crossbar Scheduling Problem
 - Statically – circuit switching (here): schedule a TST switch
 - Dynamically – packet switching (next para.): input queued switches

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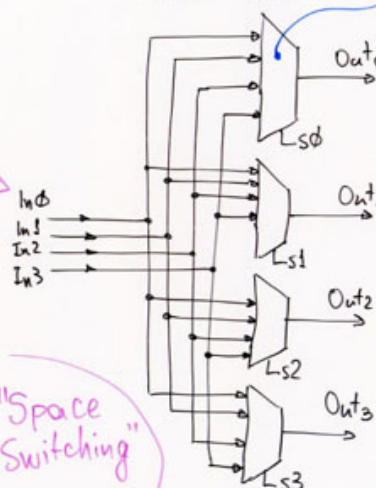
1

Can all switching be performed using Time Division Switching?



what if this is not implementable?.....

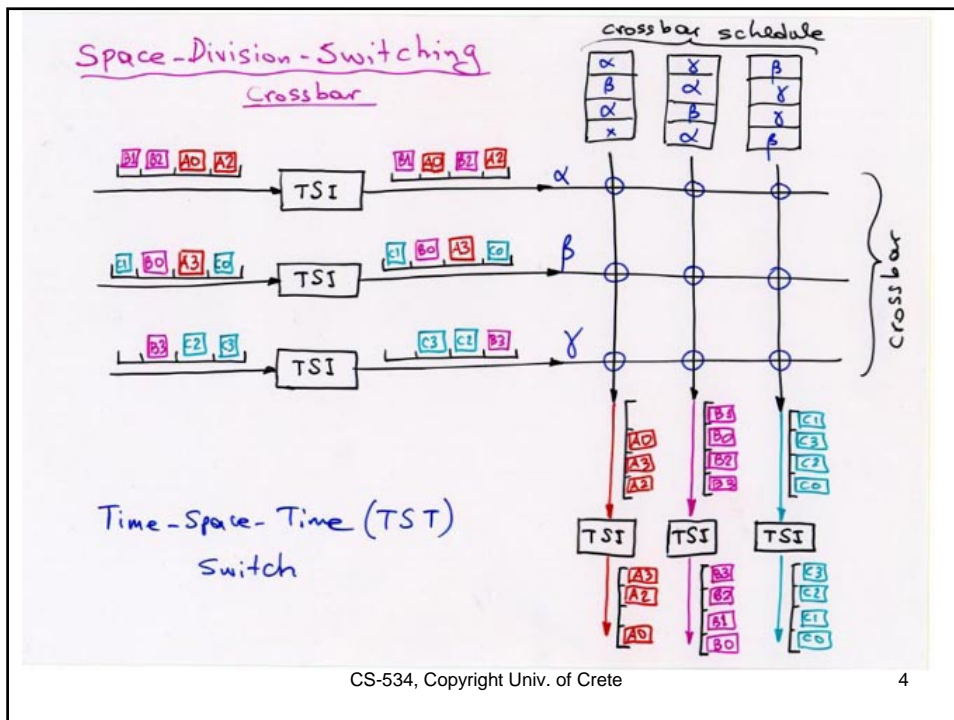
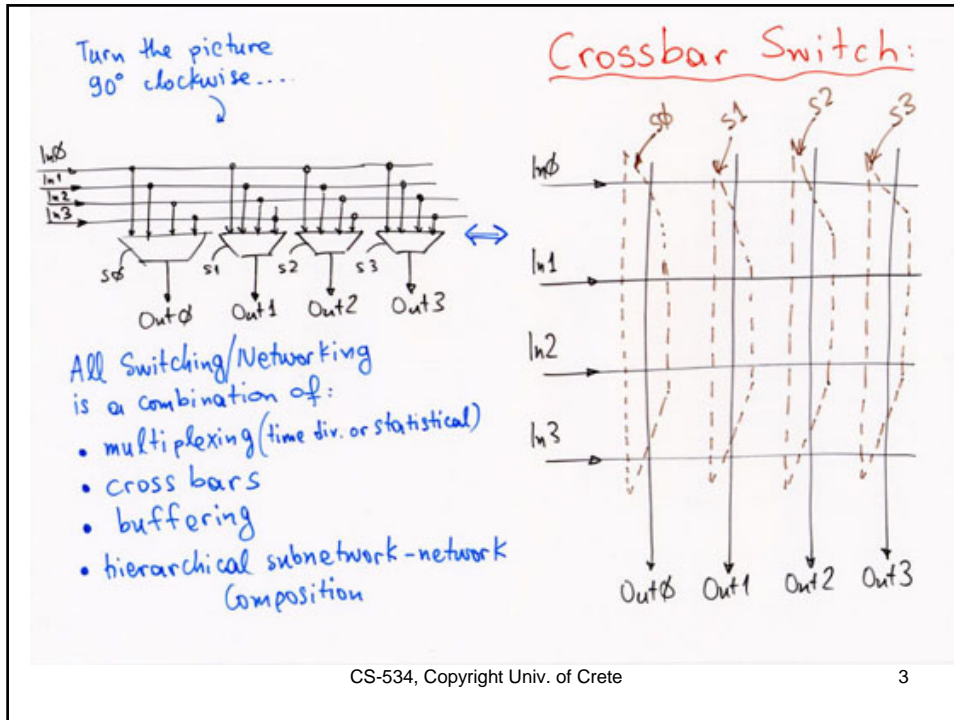
selection (traditional mux)
– not parallel-to-serial
– not TDM



"Space Switching"

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2



The (Static) Crossbar Scheduling Problem

		number of conn. to output...				
		A	B	C	D	Tot.
number of conn. from input...	a	1	3	2	0	6
	b	2	1	1	2	6
	c	1	2	2	1	6
	d	2	0	1	3	6
Tot.		6	6	6	6	

Crossbar Schedule:

■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■

$m=6$ slots per frame

$n=4$ outputs

$n=4$ inputs

- Given the number of connections requested from each input to each output (left matrix), find a schedule (middle)

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Building the Schedule one Step at a Time

		number of conn. to output...				
		A	B	C	D	Tot.
number of conn. from input...	a	1	3	2	0	6
	b	2	1	1	2	6
	c	1	2	2	1	6
	d	2	0	1	3	6
Tot.		6	6	6	6	

=

■
■
■
■

		number of conn. to output...				
		A	B	C	D	Tot.
a	1	0	0	0	0	1
b	0	0	1	0	0	1
c	0	1	0	0	0	1
d	0	0	0	1	0	1
Tot.		1	1	1	1	

+

		number of conn. to output...				
		A	B	C	D	Tot.
a	0	3	2	0	0	5
b	2	1	0	2	0	5
c	1	1	2	1	0	5
d	2	0	1	2	0	5
Tot.		5	5	5	5	

- Decompose the (full) request matrix into the sum of a permutation matrix plus a “smaller” (full) request matrix
- What about requests arriving one-at-a-time? (exer. 7)

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