



## Spanning Tree Protocol

EE 122: Intro to Communication Networks  
Fall 2007 (WF 4-5:30 in Cory 277)

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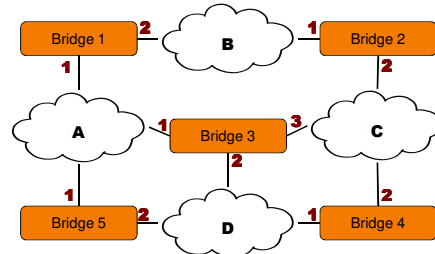
<http://inst.eecs.berkeley.edu/~ee122/>

Slides by Lisa Fowler

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## Spanning Tree Protocol Required Elements

- Each bridge has a unique Bridge ID = unique device ID + priority number
- Within each bridge, each port has a unique ID



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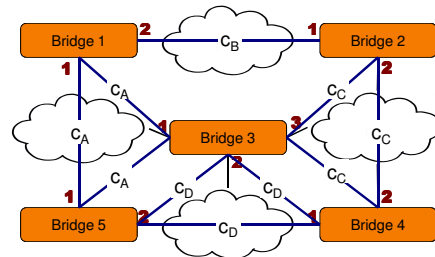
## Overview

- Networks need redundancy
  - Provide redundant paths between end stations to enable the Bridged LAN to continue to provide the Service in the event of component failure (of bridge or segment)
- Loops can cause major problems
  - Ethernet does not provide any notion like TTL in order to eventually remove looping frames
- Reduce bridge topology to a single *spanning tree*
  - Trees have no cycles  $\Rightarrow$  loop-free
  - Automatically reconfigure the spanning tree in a reproducible and predictable manner

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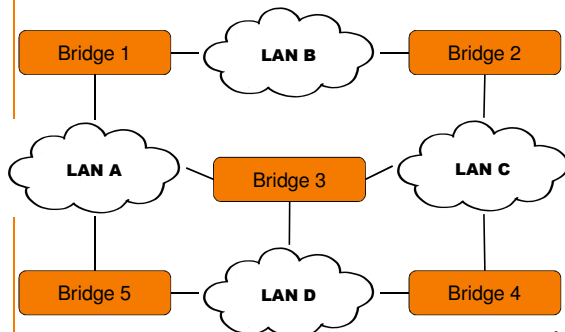
## Spanning Tree Protocol Required Elements

- Assign a cost to the segments between any two bridges (can be custom, unlike in lecture, where we used uniform cost)



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## Network Diagram

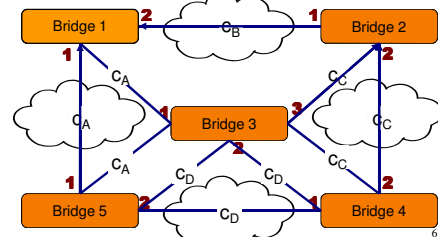


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## Spanning Tree Protocol

1. Elect a root bridge
  - a) Compare Bridge ID (compare priority number then compare unique ID)
2. Each bridge selects a *root port*: the port with the least cost path to the root

**Costs**  
 $C_A - 100$   
 $C_B - 19$   
 $C_C - 4$   
 $C_D - 100$



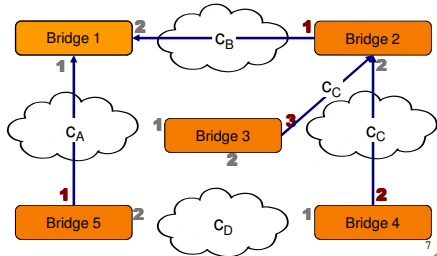
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## Spanning Tree Protocol

2. Each bridge selects a *root port*: the port with the least cost path to the root
  - a) Break ties by picking neighbor w/ lowest ID

**Costs**  
 $c_A = 100$   
 $c_B = 19$   
 $c_C = 4$   
 $c_D = 100$

Bridge	Root Port
1	
2	1
3	3
4	2
5	1

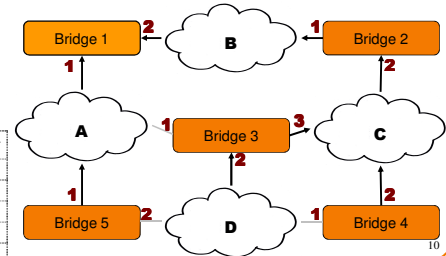


## Spanning Tree Protocol

4. If there's still a tie for any of the above, pick the lowest port #

**Costs**  
 $c_A = 100$   
 $c_B = 19$   
 $c_C = 4$   
 $c_D = 100$

Bridge	Root Port	Desgn. Port
1		1,2
2	1	2
3	3	2
4	2	
5	1	

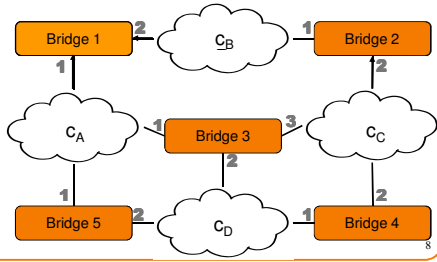


## Spanning Tree Protocol

3. All bridges on the network segment collectively determine least cost path from network segment to root
  - a) The port that connects the network segment to the bridge that provides this path is called the *designated port*

**Costs**  
 $c_A = 100$   
 $c_B = 19$   
 $c_C = 4$   
 $c_D = 100$

Bridge	Root Port	Desgn. Port
1		1,2
2	1	2
3	3	2
4	2	
5	1	

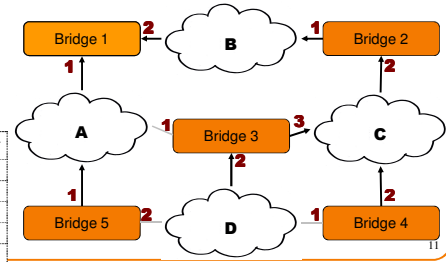


## Spanning Tree Protocol

5. Now any time frames require broadcasting, a bridge *only accepts them from a designated or a root port* ...
6. ... and only floods to other root or designated ports

**Costs**  
 $c_A = 100$   
 $c_B = 19$   
 $c_C = 4$   
 $c_D = 100$

Bridge	Root Port	Desgn. Port
1		1,2
2	1	2
3	3	2
4	2	
5	1	



## Spanning Tree Protocol

- a) The port that connects the network segment to the bridge that provides this path is called the *designated port*
  - i. Break ties by picking bridge w/ lowest ID

**Costs**  
 $c_A = 100$   
 $c_B = 19$   
 $c_C = 4$   
 $c_D = 100$

Bridge	Root Port	Desgn. Port
1		1,2
2	1	2
3	3	2
4	2	
5	1	

