Getting more Nines with Routerboard and RouterOS

MUM - Abuja

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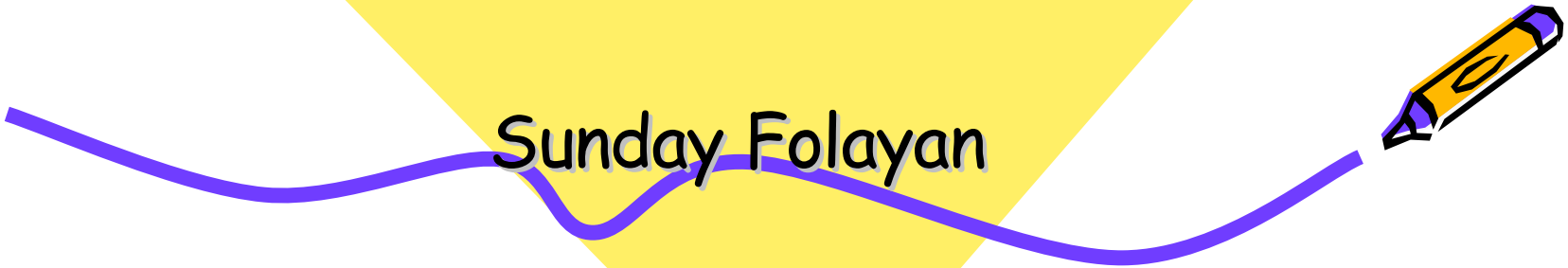
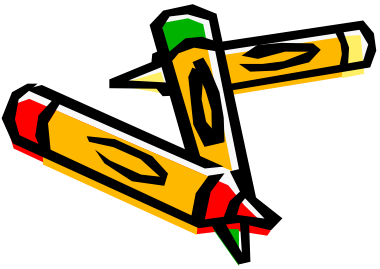


Nines mean Availability

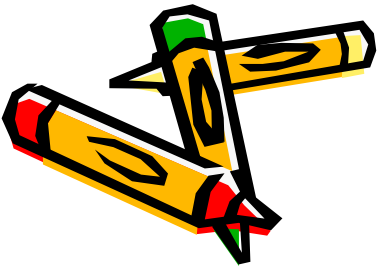
Availability is the proportion of time a system is in functional condition, to the total elapsed time.

Typical availability objectives are specified either in percentage such as 99.9%, decimal fractions, such as 0.9998, or sometimes in a logarithmic unit called nines, which corresponds roughly to a number of nines following the decimal point, such as "five nines" for 0.99999 reliability."

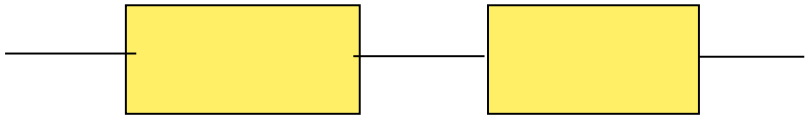


How far can we go?

Availability %	Downtime per year	Downtime per month*	Downtime per week
98%	7.30 days	14.4 hours	3.36 hours
99%	3.65 days	7.20 hours	1.68 hours
99.5%	1.83 days	3.60 hours	50.4 min
99.9%	8.76 hours	43.2 min	10.1 min
99.99%	52.6 min	4.32 min	1.01 min
99.999%	5.26 min	25.9 s	6.05 s
99.9999%	31.5 s	2.59 s	0.605 s



How bad can it get

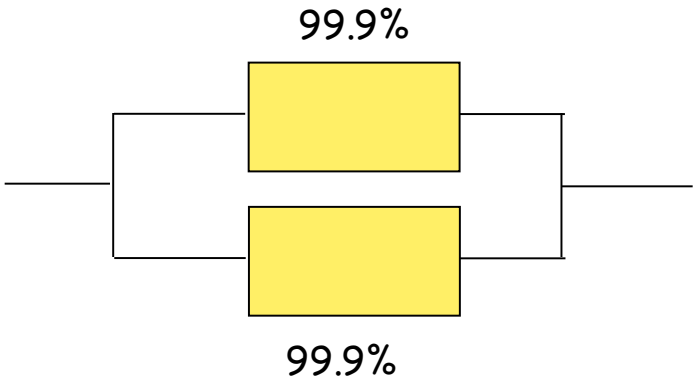


With two devices (A and B) in Series, Overall system Availability is Availability of A multiplied by the Availability of B

Availability is 99.8%

Availability of Series components is always less than the availability of the individual components

How good can it get



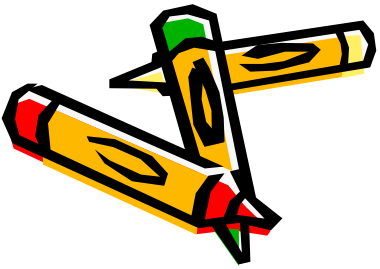
With two devices (A and B) in parallel, Overall system Availability is 100, less Non-Availability of A and B. ie (100 – AxB). In this case, 100 – (0.1x0.1)

Availability is 99.99%

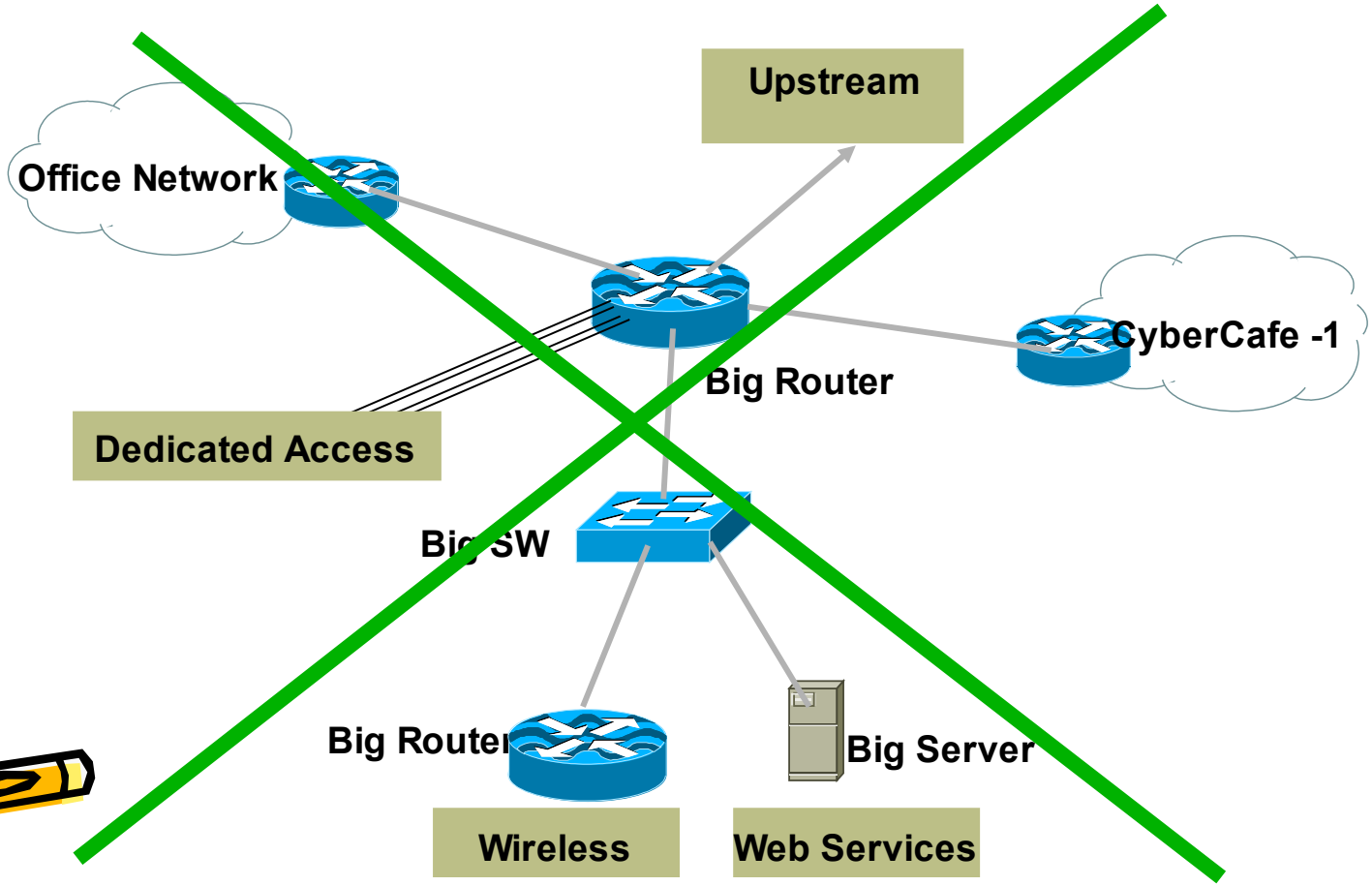
Availability of parallel components is always higher than the availability of the individual components

Intepretе with Caution!

6 repeated 10 minutes downtimes happening every hour is not the same as one downtime lasting 1 hour minutes

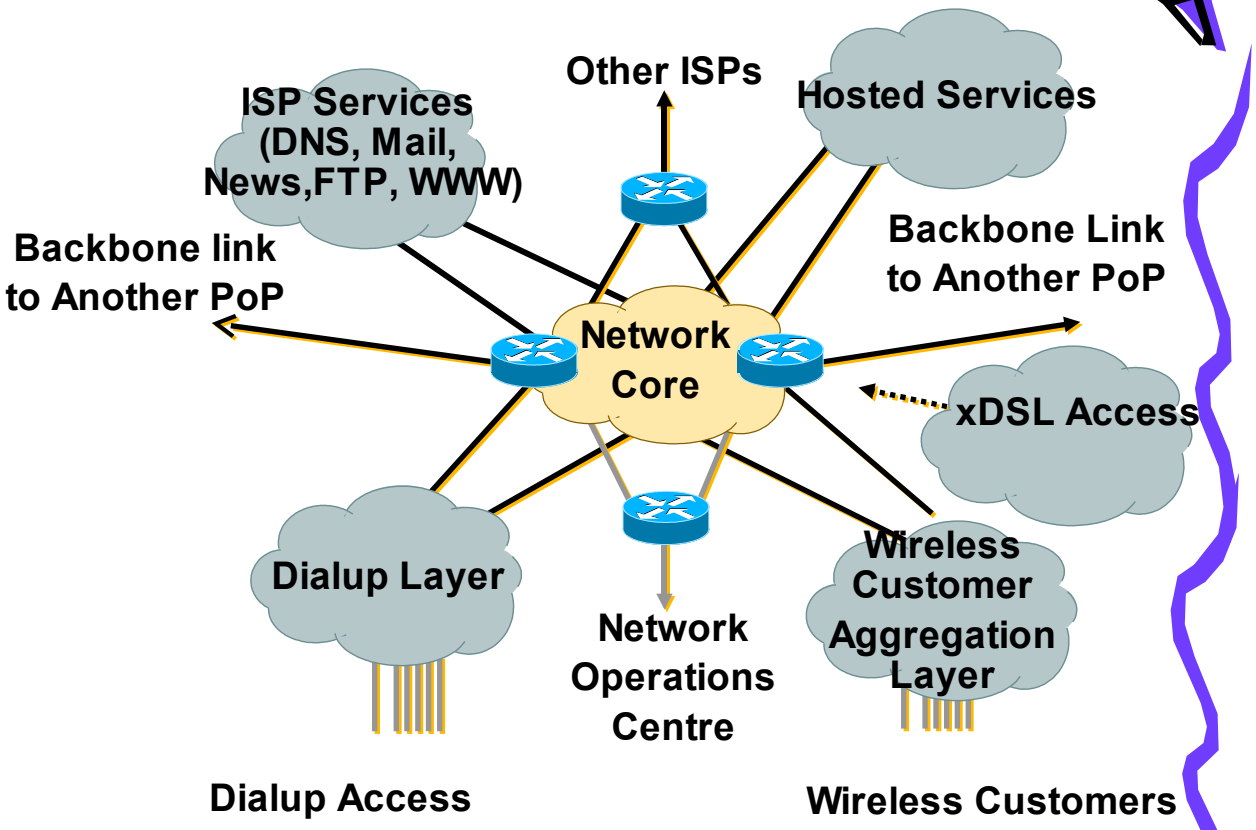


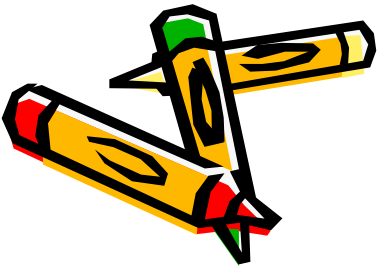
Typical ISP Network



Modular/Structured Design

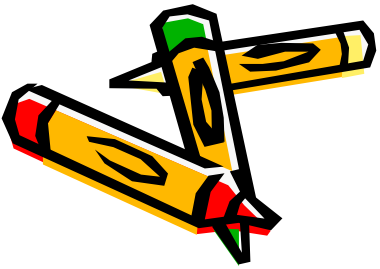
- Organize the network into separate and repeatable modules
  - Backbone
  - Wireless Access
  - Hosted services
  - Dialup Access
  - Leased Lines





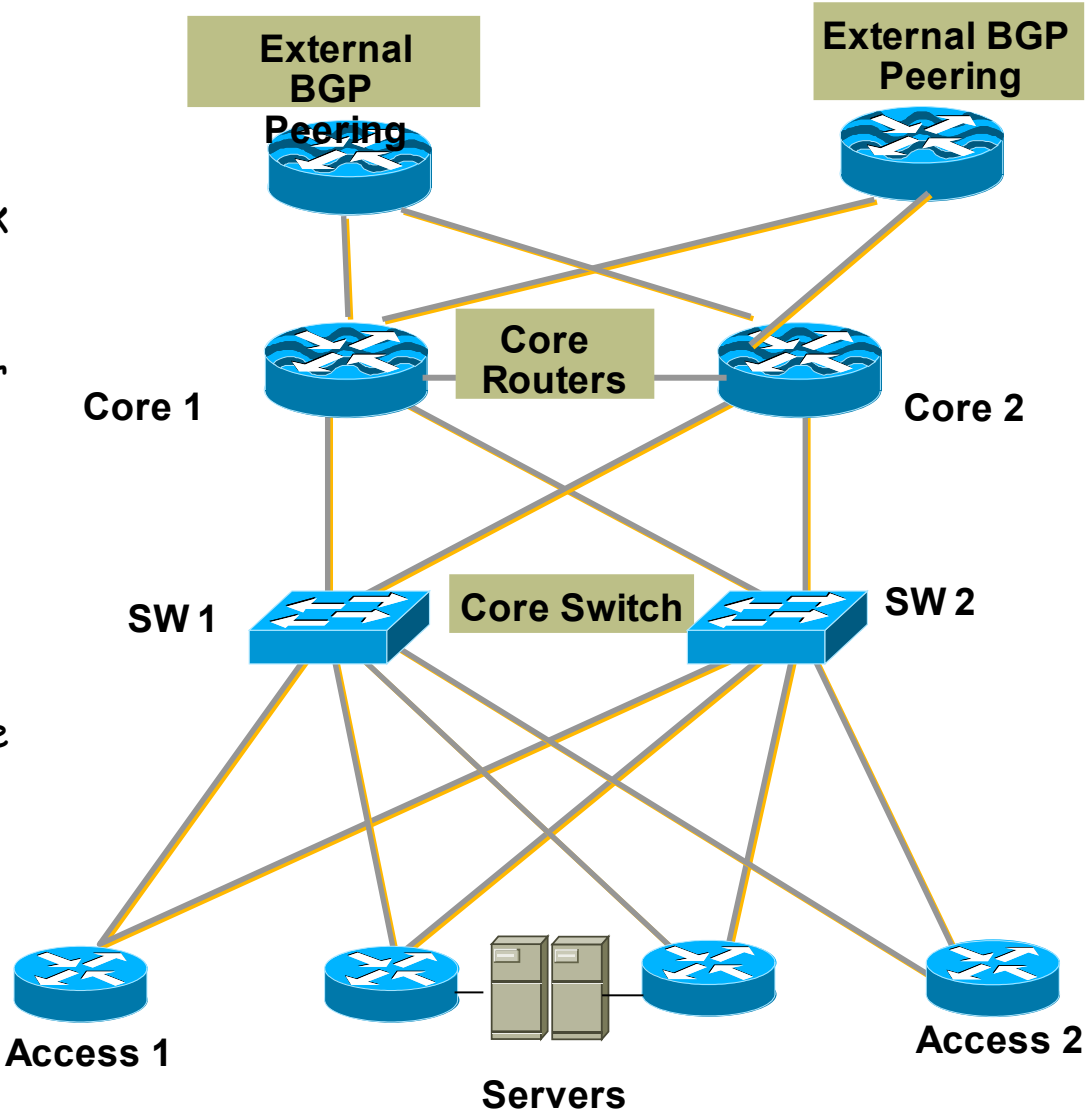
Important Considerations

- Redundancy is very important
- One router cannot do it all
- Most successful Networks have two of everything
- Two smaller devices in place of one larger device:
  - Two routers for one function
  - Two switches for one function
  - Two links for one function
  - Keep network segmented to reduce router load
  - 45% Router load is a good rule of thumb



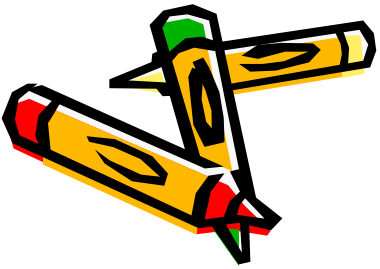
Recommended Setup

1. Modularize Network
2. Duplicate elements
3. Use different Power sources for each bank
4. Use smaller routers instead of one big router
5. Run OSPF within the network core



Establish Processes

- A well designed network only runs as well as those who operate it
- Monitor circuits, access devices, servers
- If something fails, someone has to be told
- Ignoring a problem will not fix it.
- Decide on time-to-fix, escalate up reporting chain until someone can fix it
- Decide and publish maintenance schedules
- Don't make changes outside the maintenance period, no matter how trivial they may appear



References

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- http://www.eventhelix.com/RealtimeMantra/FaultHandling/system_reliability_availability.htm
- Cisco Networkers Guide