



Reliability in Regional Networks

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Introduction

- Hats
- Background to SJ5 project
- Reliability
- What UKERNA might do
- What MANs could do



Hats

- I would like to initiate a discussion among fellow network operators
 - User and institutional requirements are being collected in a separate consultation



Background to SJ5 project

- Requirements analysis
 - Views from the community on
 - Reliability
 - Services
 - Bandwidth
 - Applications
 - Etc etc etc
 - Investigations
 - Carrier class routers &
 - Reliability
 - Transmission technology
 - Architecture

Jeremy Sharp

Roland Trice
Henry Hughes
Duncan Rogerson



Background to SJ5 project

- Reporting in December
 - Network Strategy Workshop
 - JCN
 - JISC
 - SJ5 web pages
- Basis for funding provision
 - No CSR this time around
 - Can't assume how much or over what period



Background to SJ5 project

- If we get the funding
- Procure new bandwidth in 2004
- Roll out in 2005
- Key features
 - Reliability and availability
 - Multiple service streams
 - End-end delivery
- <http://www.ja.net/SJ5>



Reliability

- Seen as key feature of new network
 - JANET necessary for core business activities
 - End-end reliability needed for emerging services
- My task
 - To determine how important JANET actually is to institutions and to users
 - To recommend ways in which reliability may be improved in a scaleable and affordable way
 - Cost benefit analysis to maximize value for money



Regional Networks

- Are key players in the delivery of JANET services
- Need to have:
 - Reliable connections to the JANET core
 - Reliable internal architecture
 - Reliable connections to institutions
 - Robust management practices
 - Fault reporting,
 - Exception detection and management
 - Competent staff in appropriate numbers



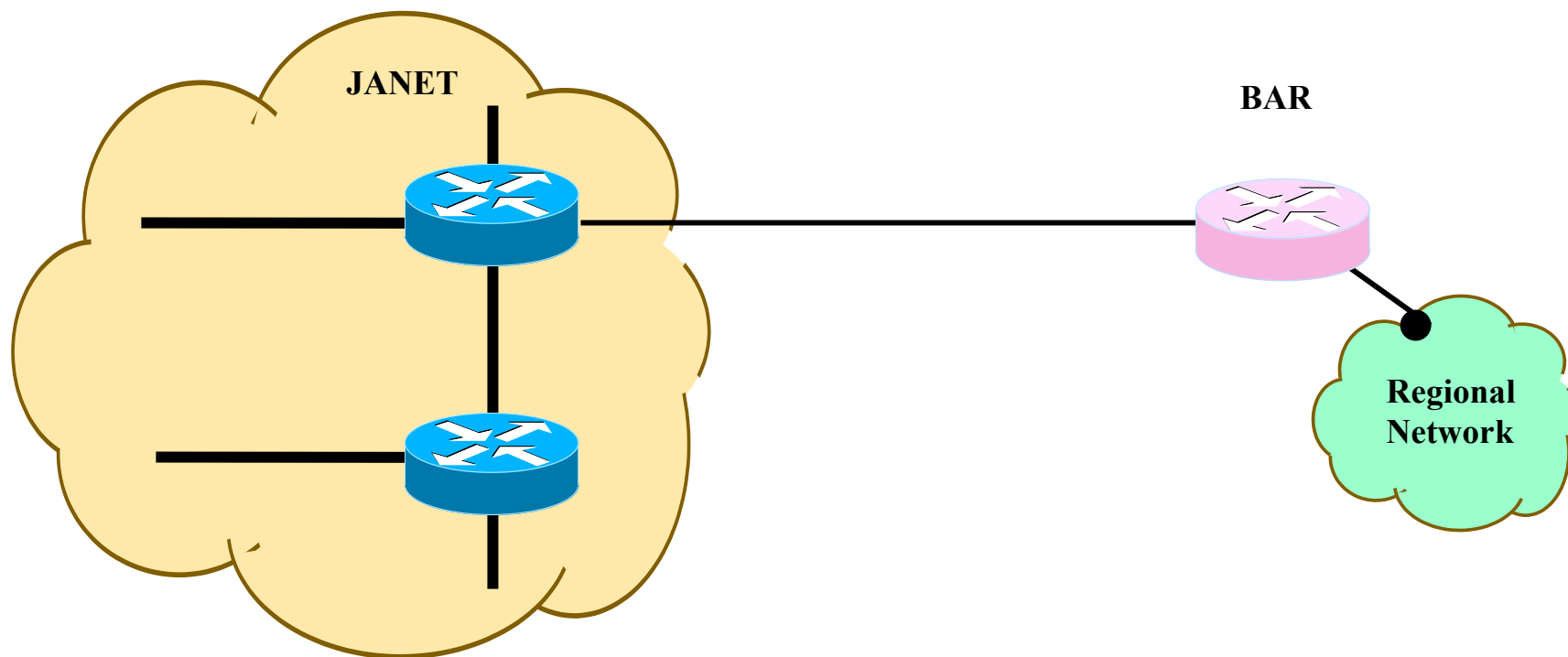
Reliable connections to JANET

- Minimize impact of single points of failure
 - Duplication of access links
 - Duplication of routers
 - Suitable environment

- UKERNA could facilitate the following:

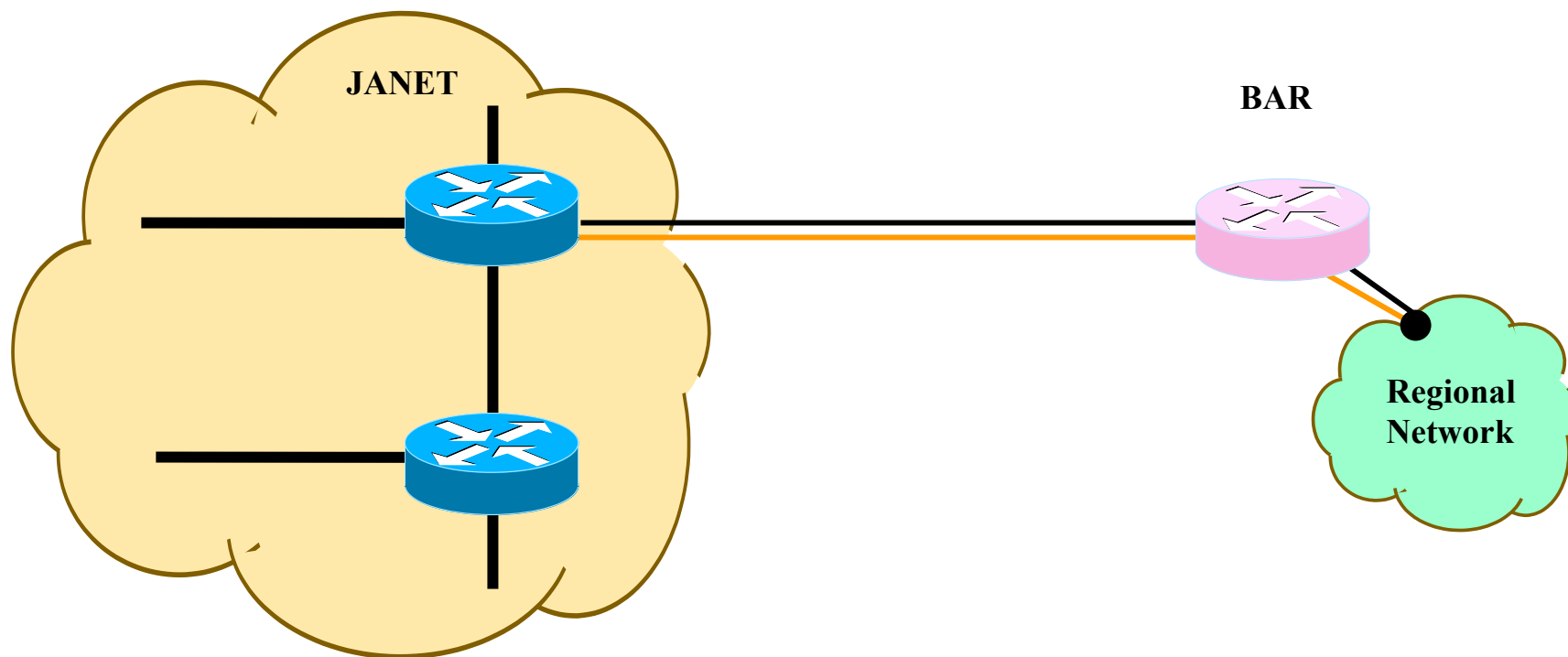


RN connection to core



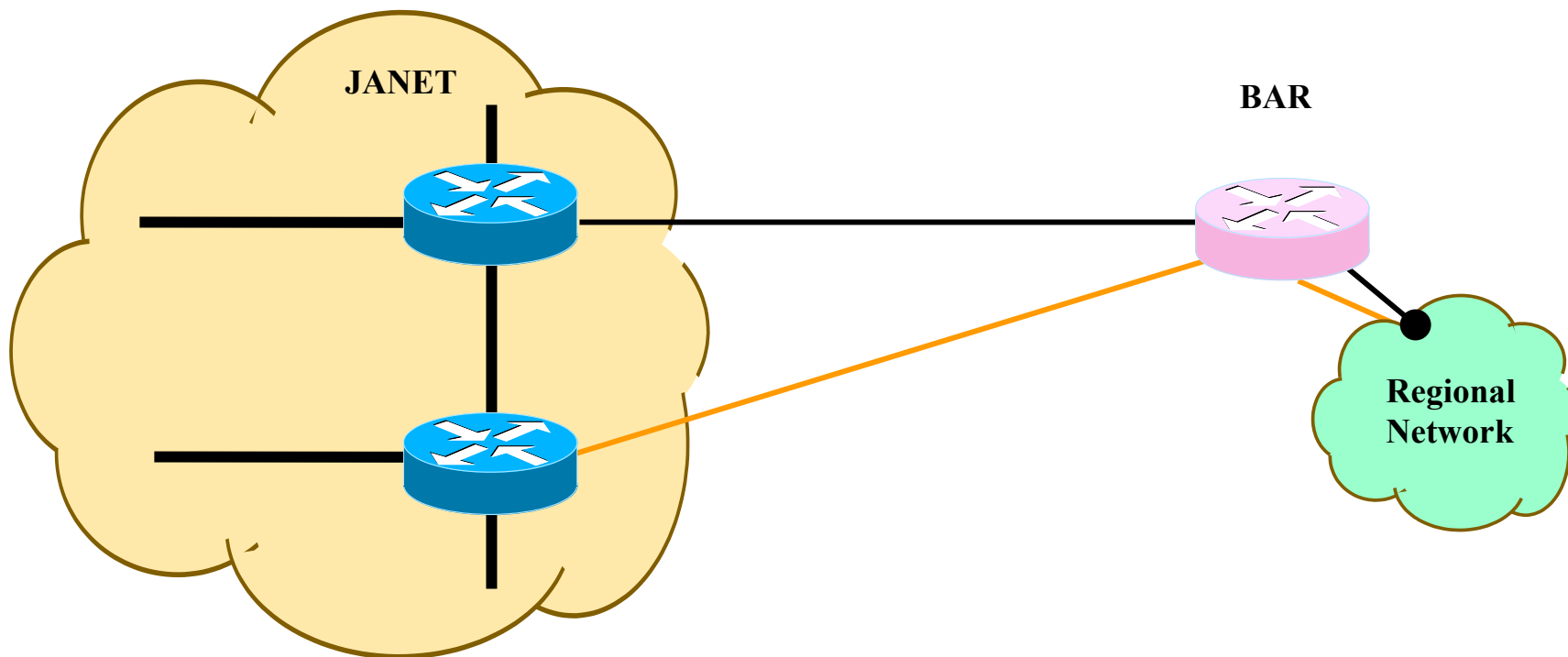


Duplicate access link





Duplicate access link to different core node



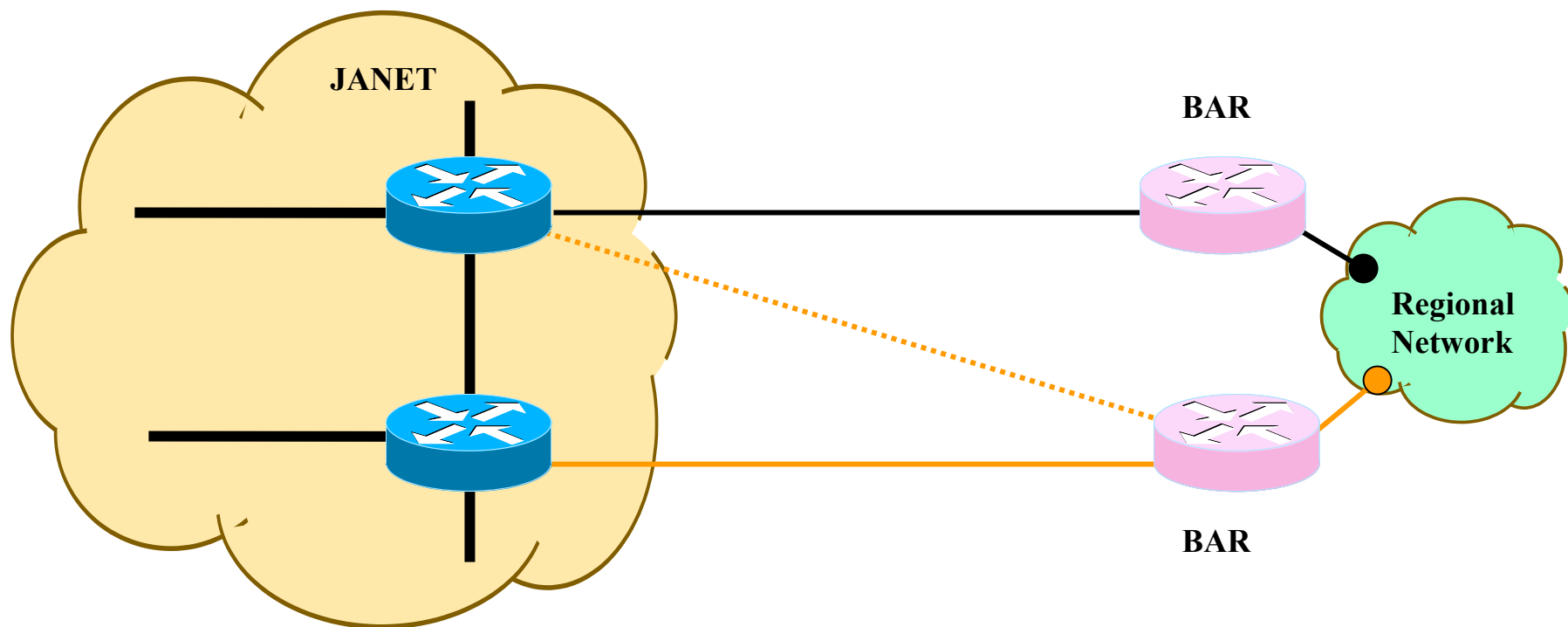


Duplicate connections

- Current connections between core and RNs have DWDM path protection or are dual dark fibre links
- Reliability has been good where “on-net”
 - MCI have improved connections which have failed
- Router hardware more of an issue
- Chassis and line cards are SPoF
 - True of Core, BAR and RN routers

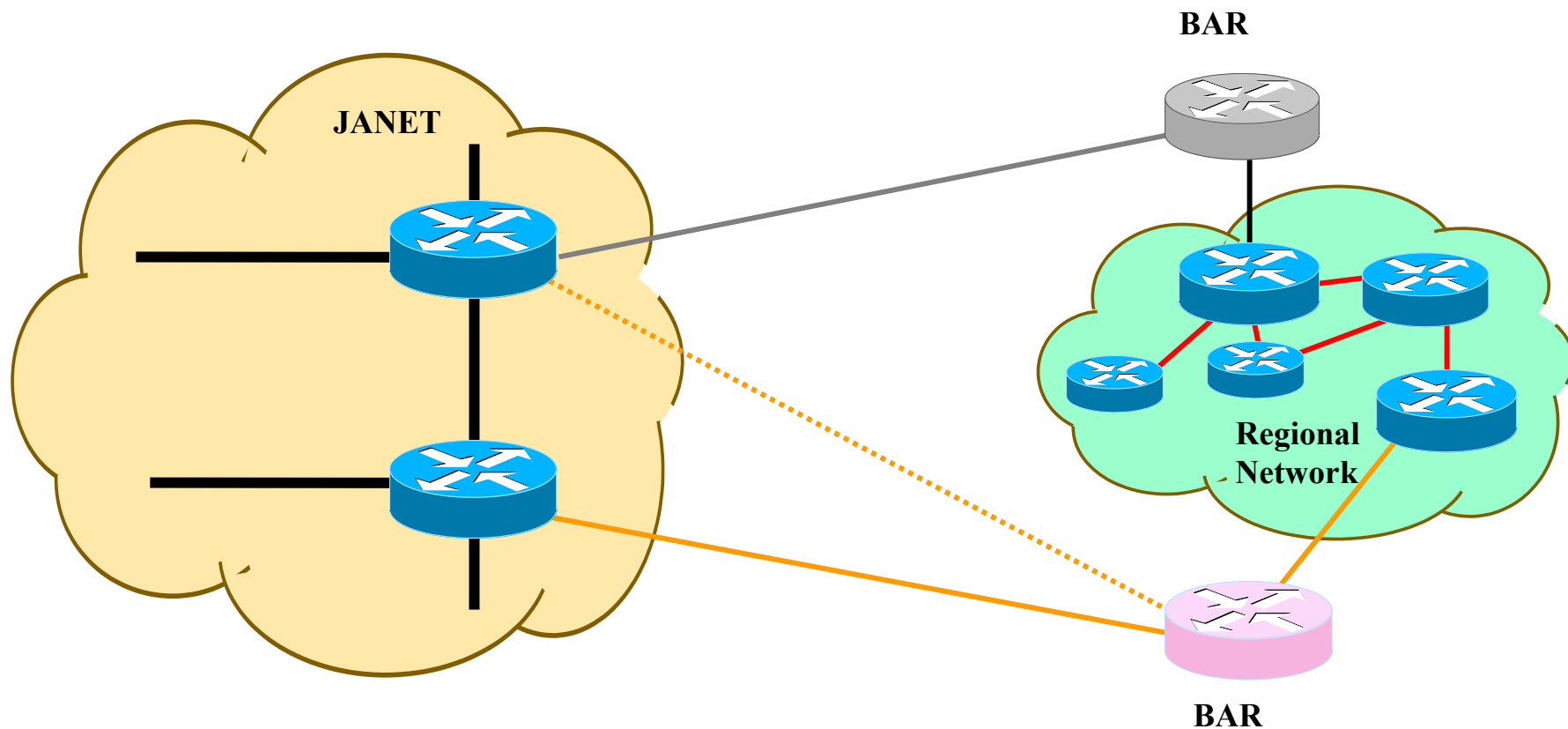


Duplicate links from 2 points on regional network

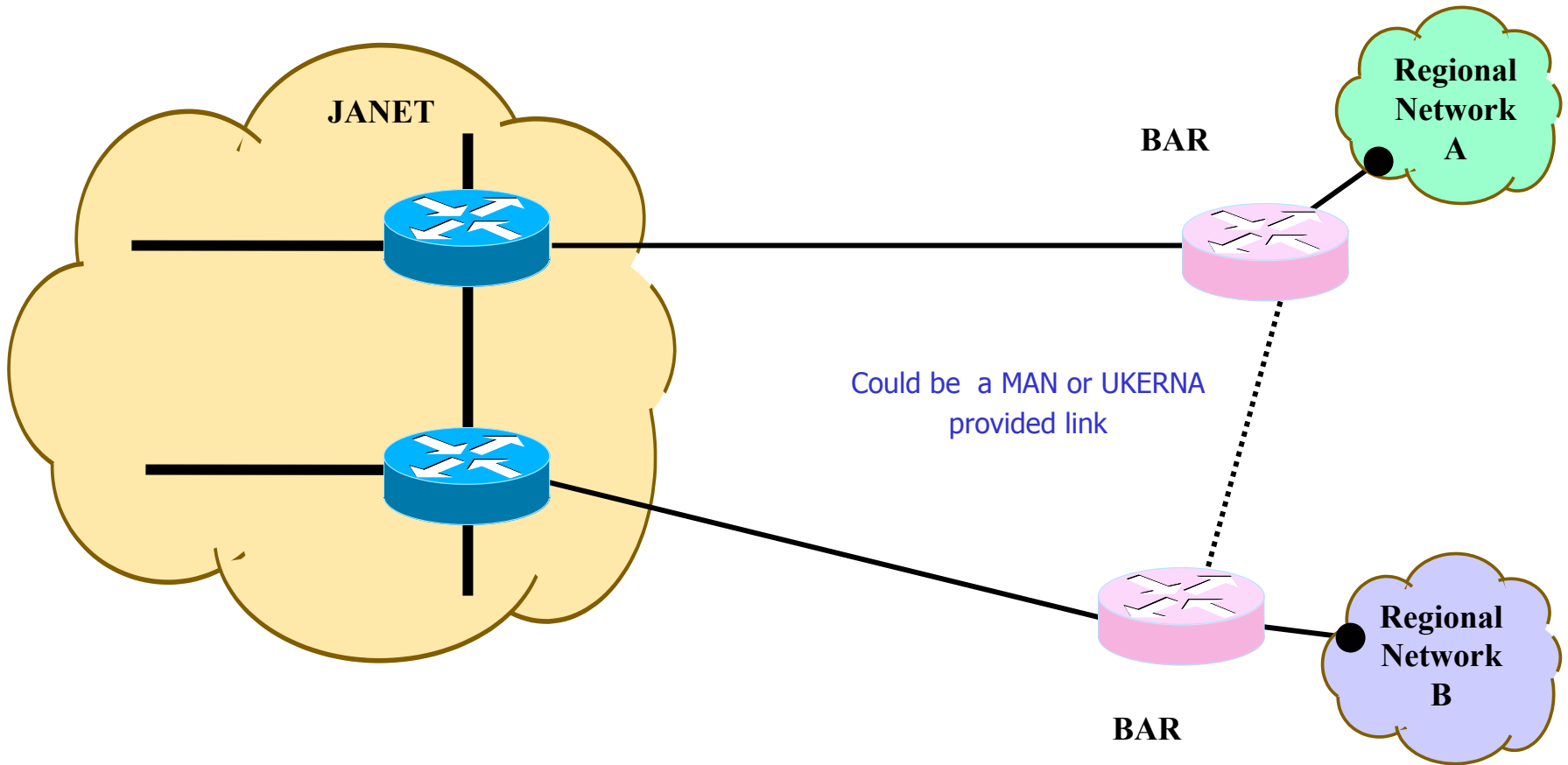




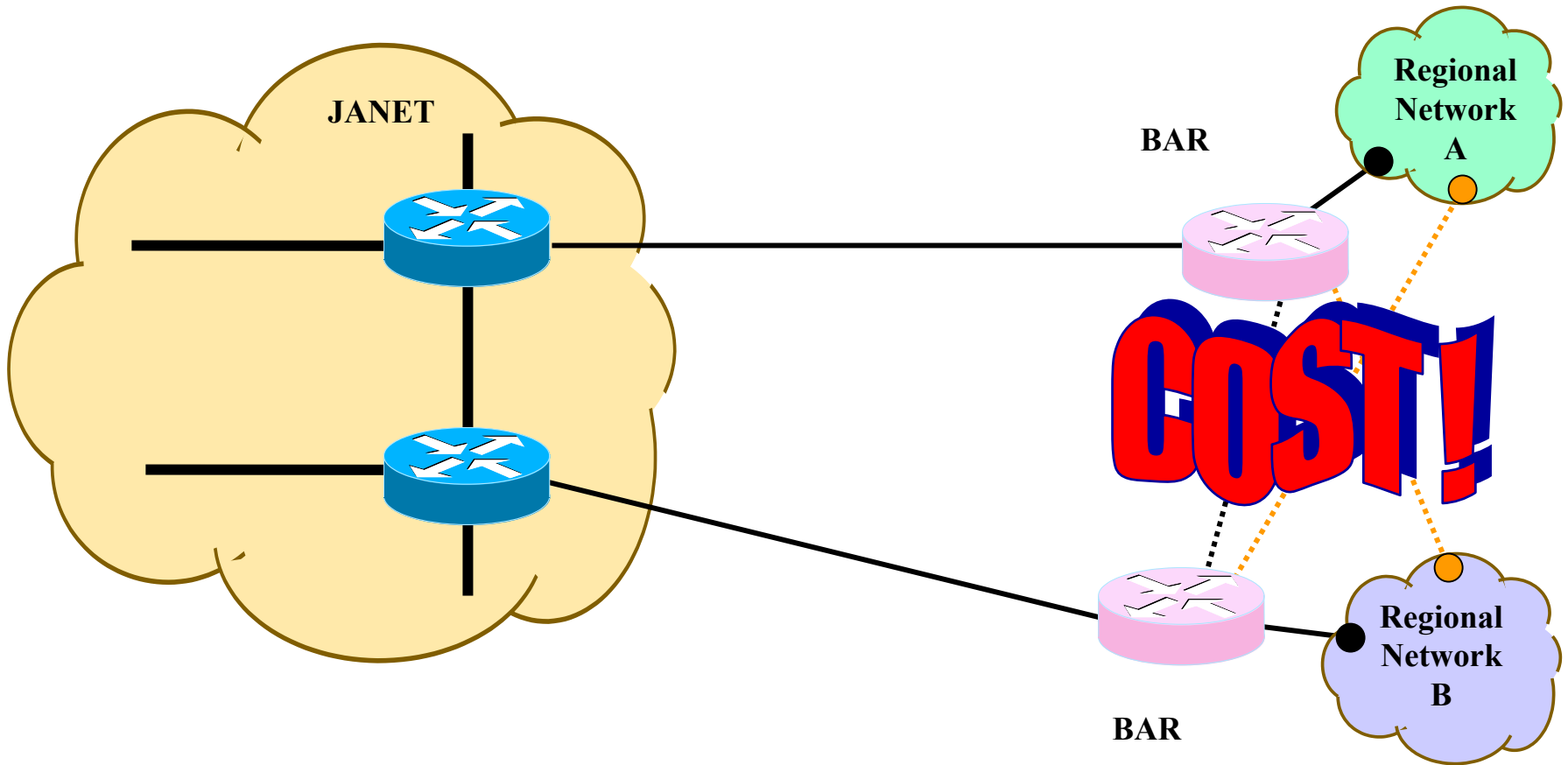
Needs fail over capacity in RN



Inter BAR links (outer ring road)

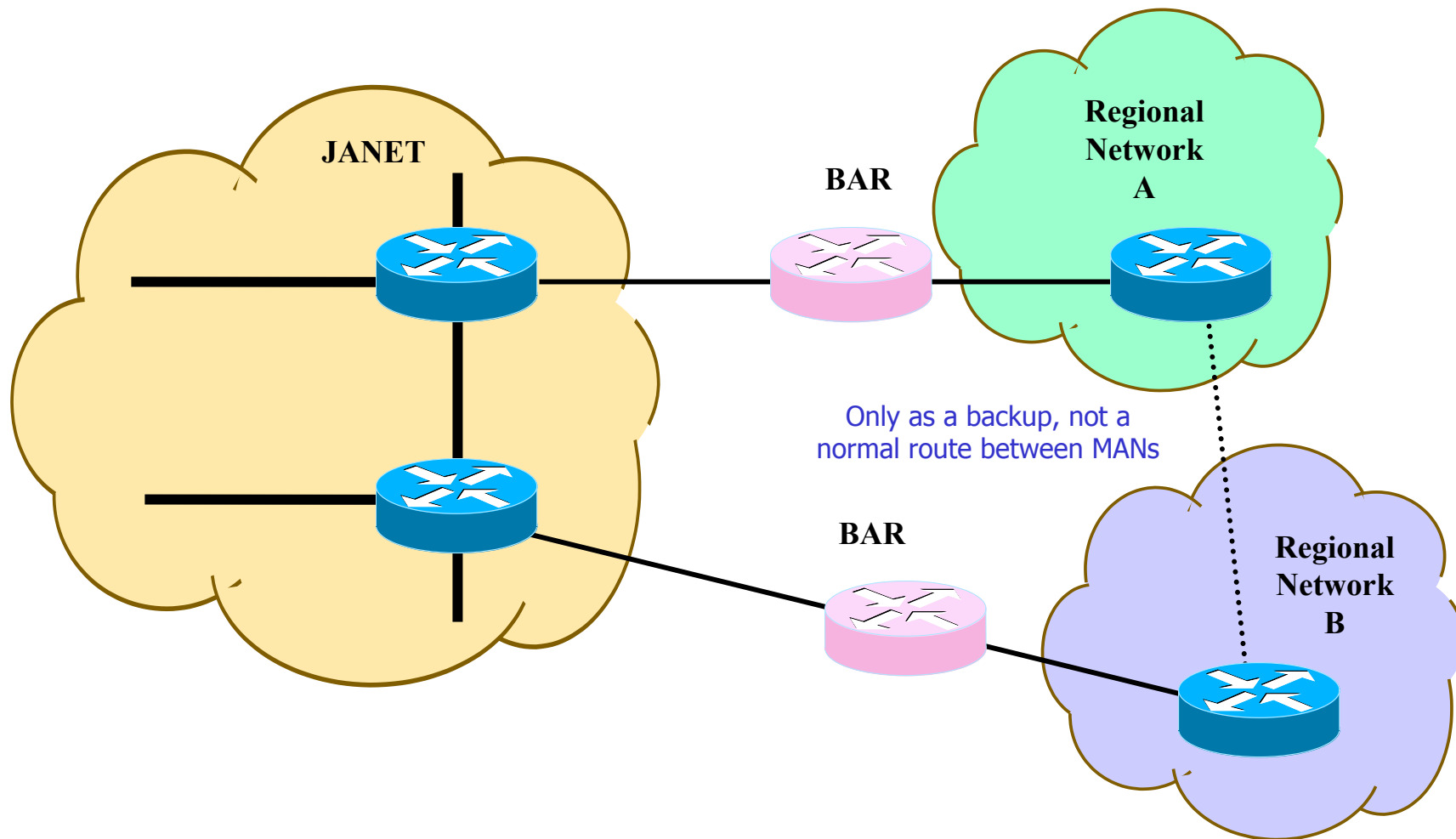


Inter BAR links (outer ring road)





Caveat-1



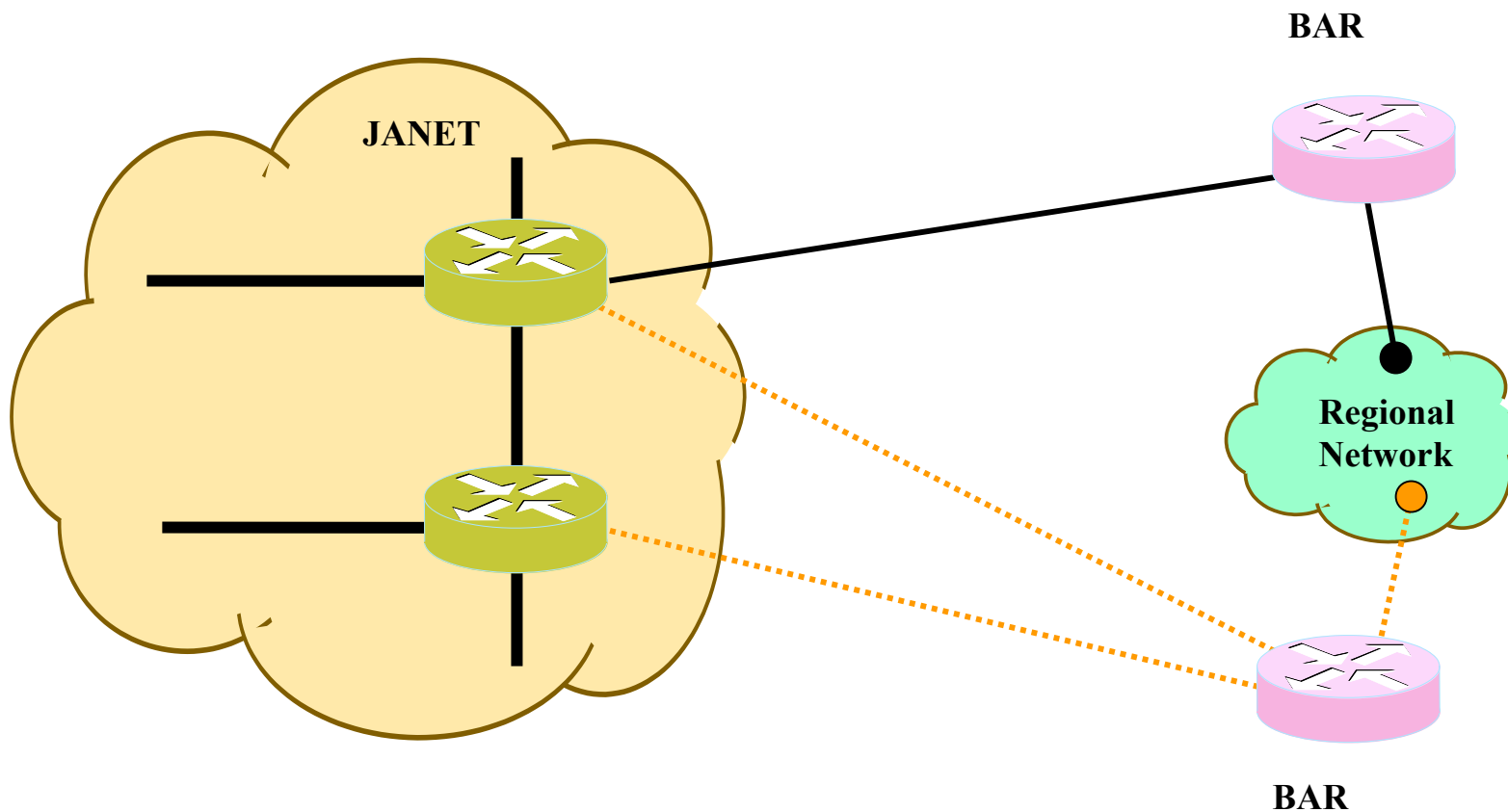
Reliable connections to JANET core



- Minimize impact of single points of failure
 - Duplication of access links
 - Duplication of routers
- Deploy next generation carrier class equipment
 - “Five Nines” reliability minimizes SPoF risk

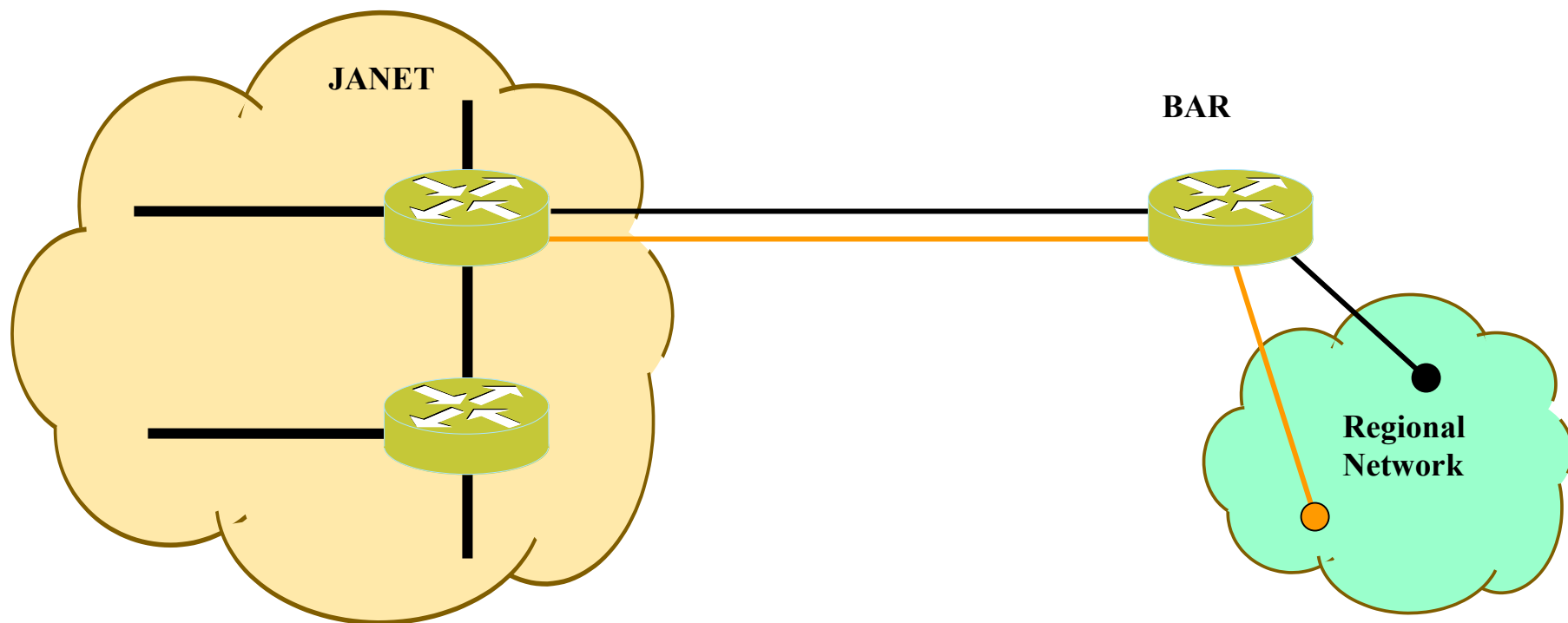


Carrier class core router





Carrier class BAR as well





Caveat-2

- Market for NG carrier class routers is immature
 - Some **really** nice routers out there
 - Lack of proven operational deployment
 - Lack of support infrastructure in the UK
- Small systems need to be deployed at edge to reduce cost and environmental issues



But only if.....

- Regional Networks are able to cope
- Internal architecture must allow for fail-over
 - Automatically
 - Predictably
 - Without minimal impact to users
- There must be sufficient bandwidth to cope with any additional traffic across the MAN's core.
- Resilience only effective if the above is true



But only if.....

- All of this assumes sufficient funds are available
- Cost benefit analysis may release funding
 - Maximise value for money
 - Smart spending
 - No point funding ineffective solutions



Access link reliability

- 2 Mbit/s the weakest link!
 - Electrical circuit reliability poor compared to fibre
 - Additional links will probably have to be self-funded
- Can you offer duplicate connections to institutions?
 - Same PoP
 - Different PoP
- Publish tariffs to institutions and UKERNA
 - How often do you shop around?



What can you do for SJ5?

- Consider the Regional Network Entry Point?
 - Does it have suitable power, A/C & UPS etc?
 - If not, why not?
 - Should the location change?
 - If yes, to where?
- Where to locate a second RNEP?
- Where to connect to
 - Resilience via third party ISP is complicated
 - May introduce more problems than it solves
 - Difficult to control routing outside of your domain



What can you do for SJ5?

- Consider the Regional Network Entry Point?
 - Does it have suitable power, A/C & UPS etc?
 - If not, why not?
 - Should the location change?
 - If yes, to where?
 - Where would you locate a second RNEP?
- If you have thoughts on this, don't wait to be asked, tell me



What can you do for SJ5?

- Consider your core architecture
 - Is it currently resilient?
 - Could it cope with fail-over to second RNEP?
- Look at “Five Nines” kit next time you procure
- Would a framework procurement be useful?
 - What sort of equipment?
 - Routers or switches?
 - Could you provide some staff effort for a procurement?



What can you do for SJ5?

- Is your network management up to scratch?
- Are your fault management practices adequate?
- Do you have enough staff dedicated to the MAN?
- What about Risk Analysis & Business continuity?
 - Is your risk assessment up-to-date?
 - What disaster recovery/BCP is in place
 - For the RNEP
 - For the MAN
- What about development?



Show and tell

- Information from RNs
 - A couple of sides of A4 to show the state of your network and anticipated developments & procurements
 - At contract review
 - As part of formal development discussions
- Information from UKERNA
 - During the bandwidth and router procurements where this is possible (ITT & BAFO stages)



Lots to think about

- Talk to your customers,
- Talk to UKERNA and the NOSC
- Talk to each other
- Better reliability comes at a price
 - Cost benefit analysis
 - Smart spending

Questions

