# 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 — Jeremy Sharp
  - Views from the community on
    - Reliability
    - Services
    - Bandwidth
    - Applications
      - Etc etc etc
  - Investigations
    - Carrier class routers &
    - Reliability — Roland Trice
    - Transmission technology — Henry Hughes
    - Architecture — 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

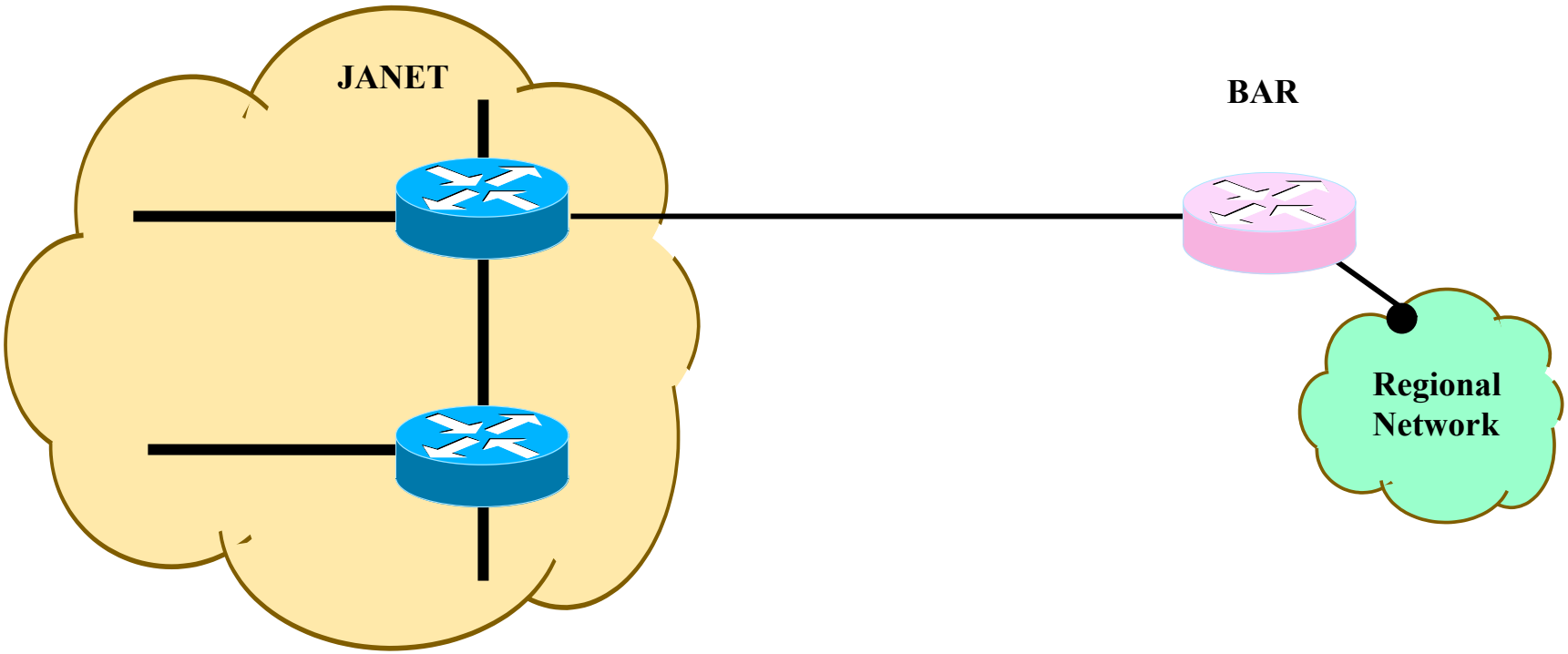
- Are key players in the delivery of JANET services
- Need to have:
  - Reliable connections to the JANET core
  - Reliable internal architecture
  - Reliable connections to institutions
  - Robust management practices
    - Fault reporting,
    - Exception detection and management
      - Competent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

# Reliable connections to JANET

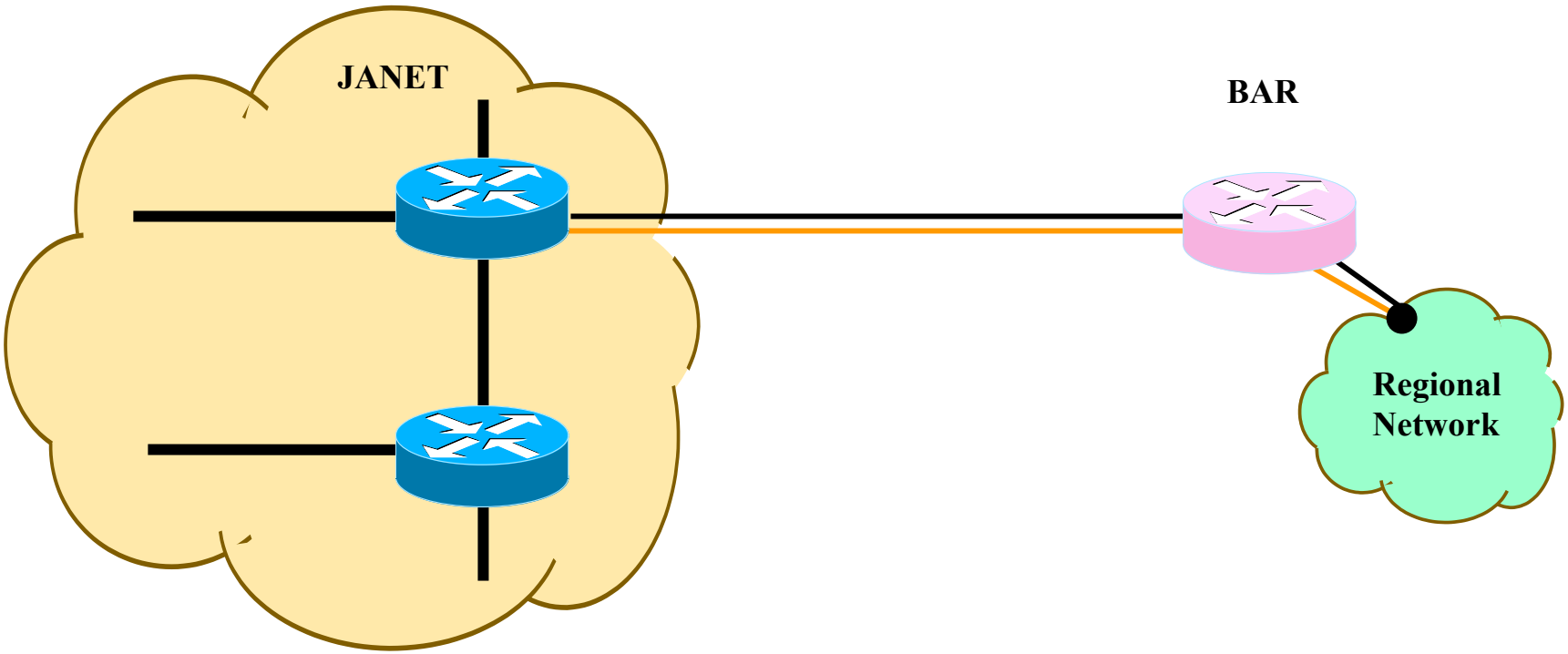
- Minimize impact of single points of failure
  - Duplication of access links
  - Duplication of routers
  - Suitable environment

- UKERNA could facilitate the following:

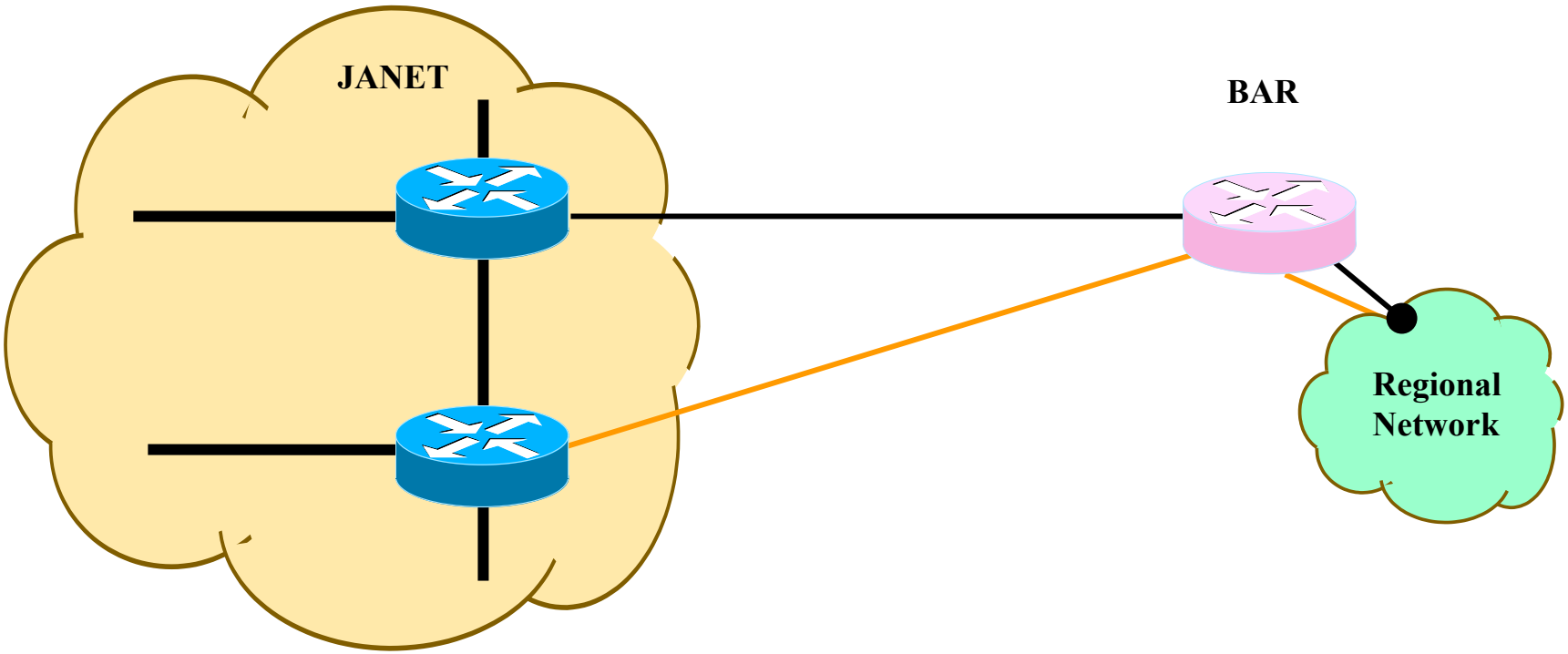
# RN connection to core



# Duplicate access link



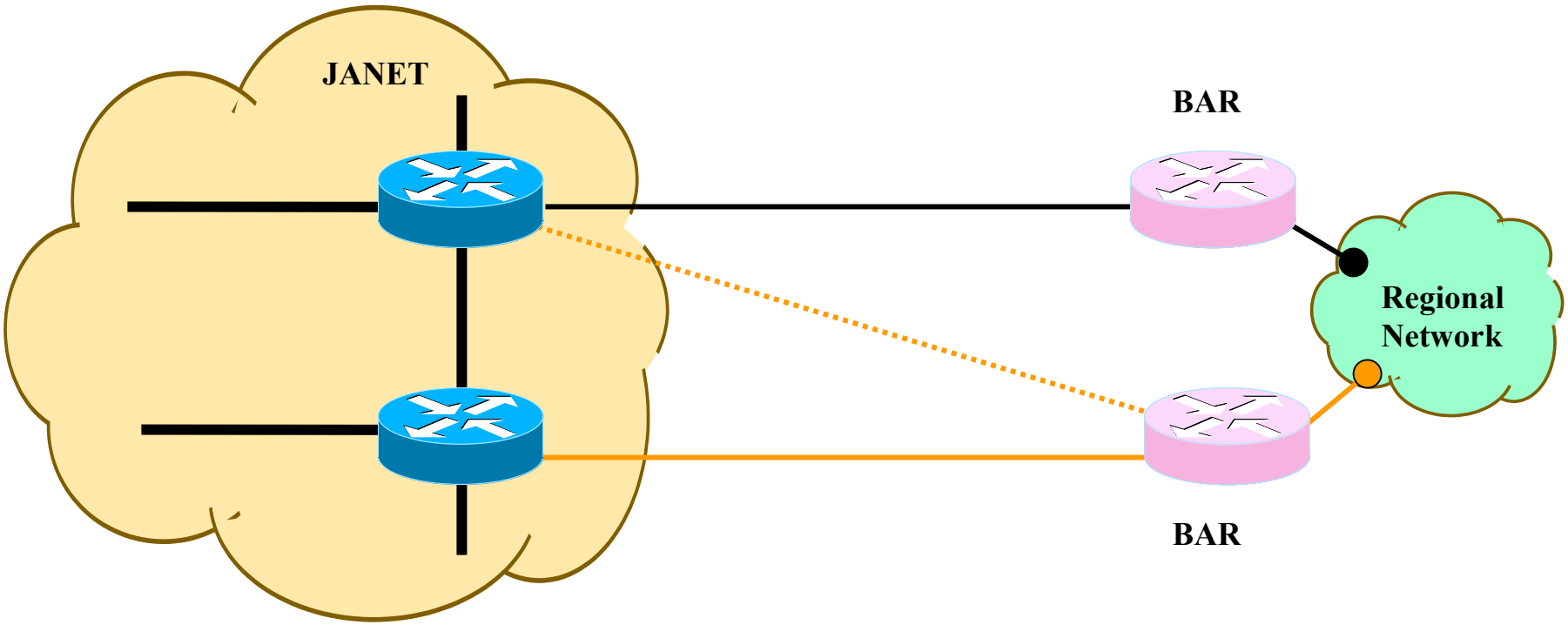
# Duplicate access link to different core node



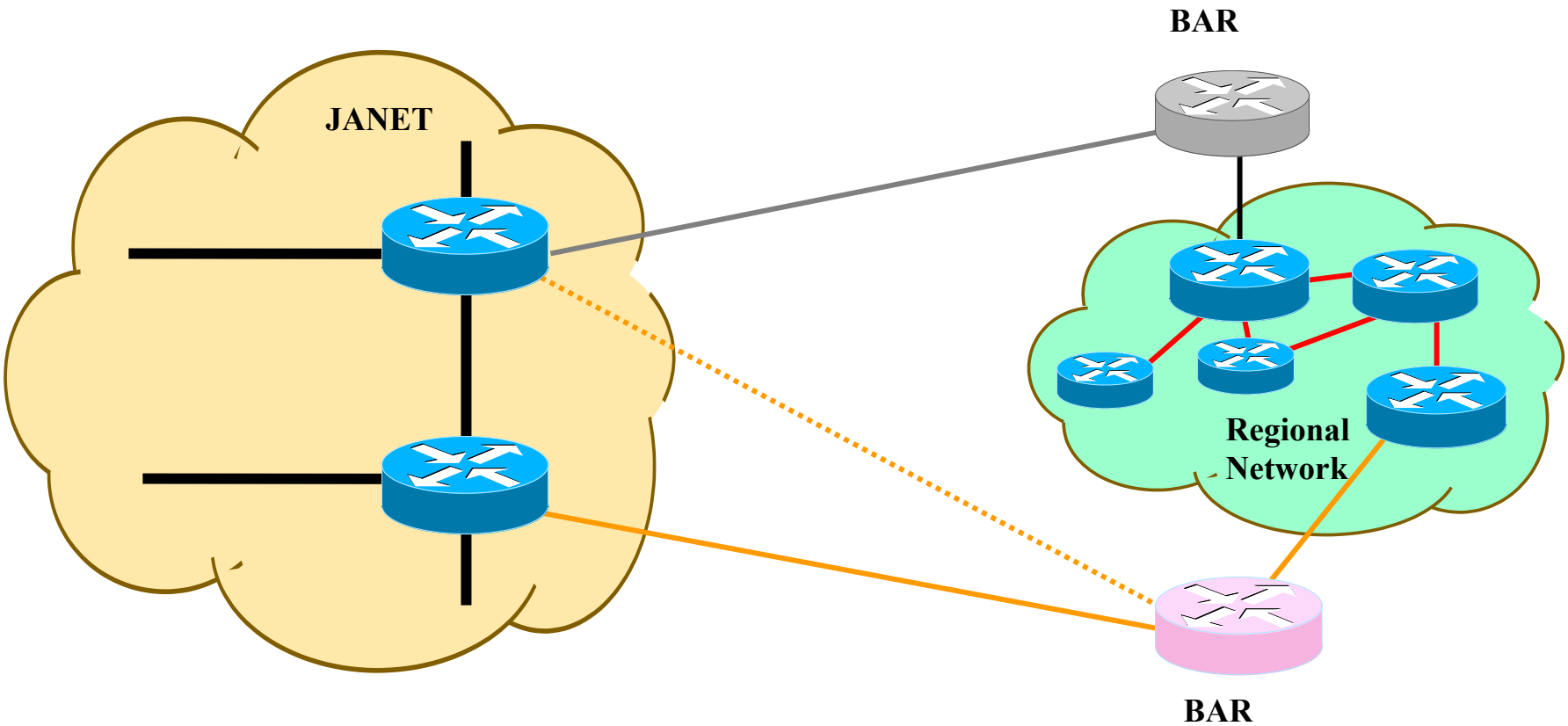
# Duplicate connections

- 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

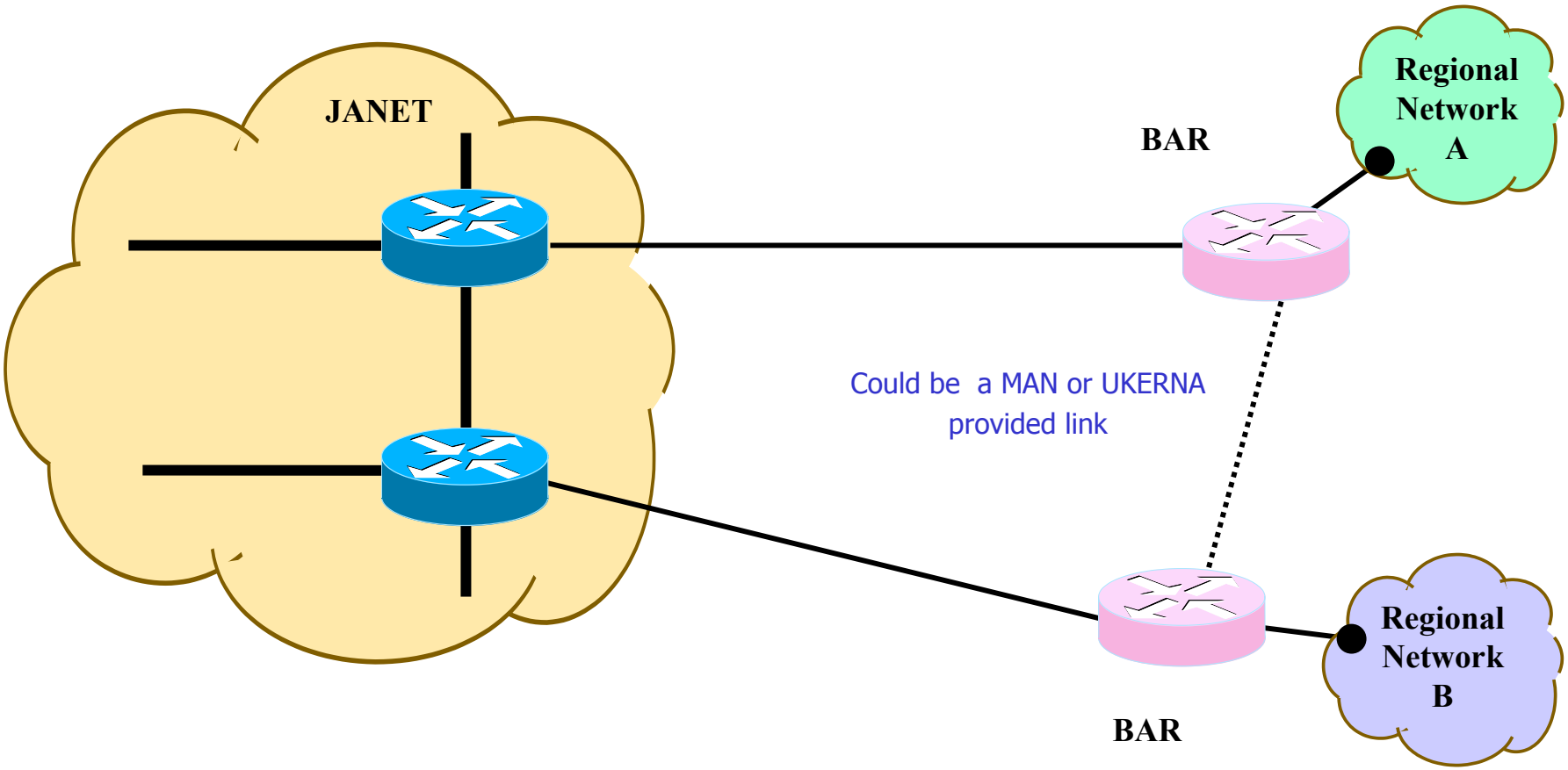
# Duplicate links from 2 points on regional network



# Needs fail over capacity in RN



# Inter BAR links (outer ring road)



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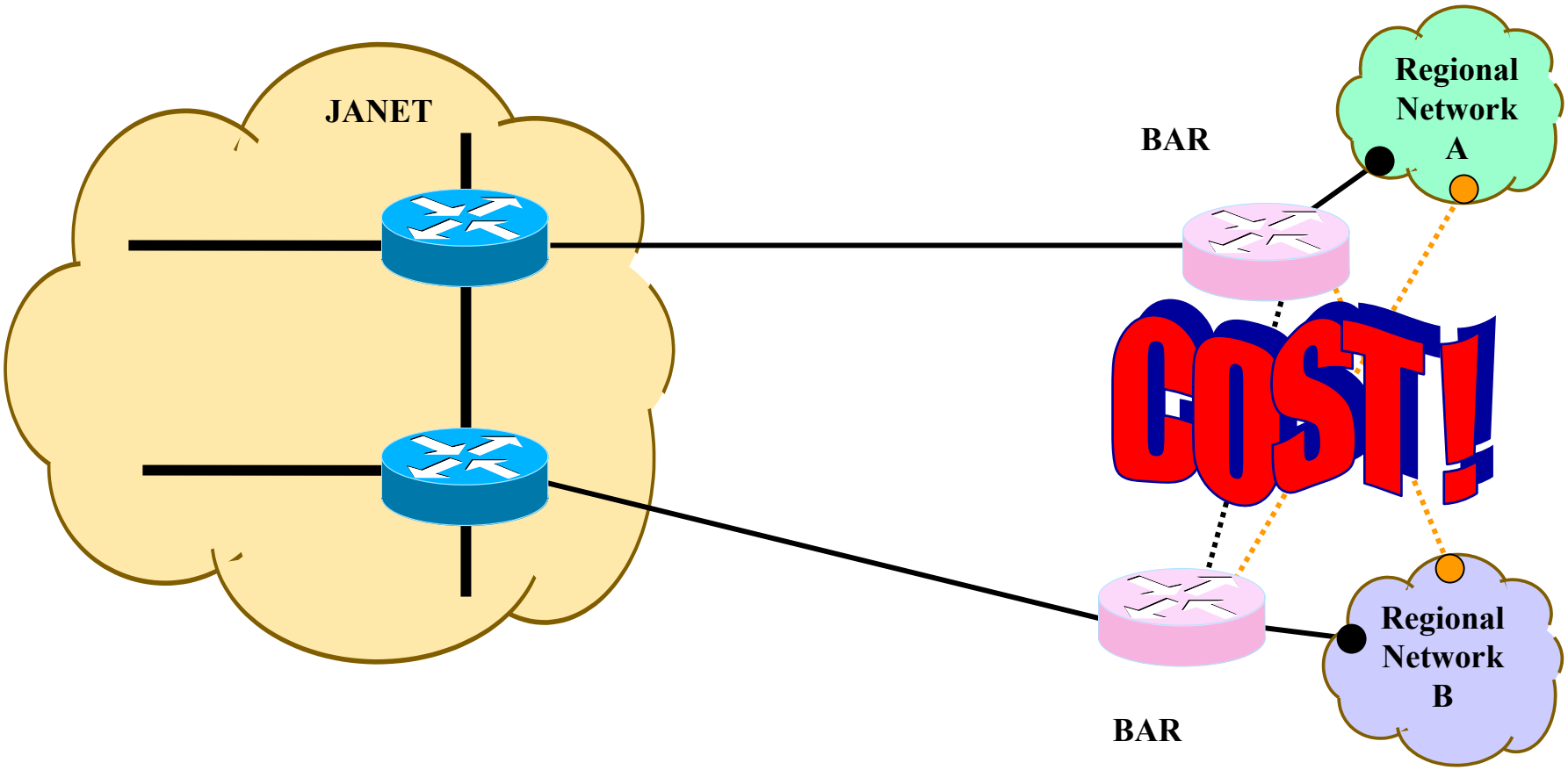
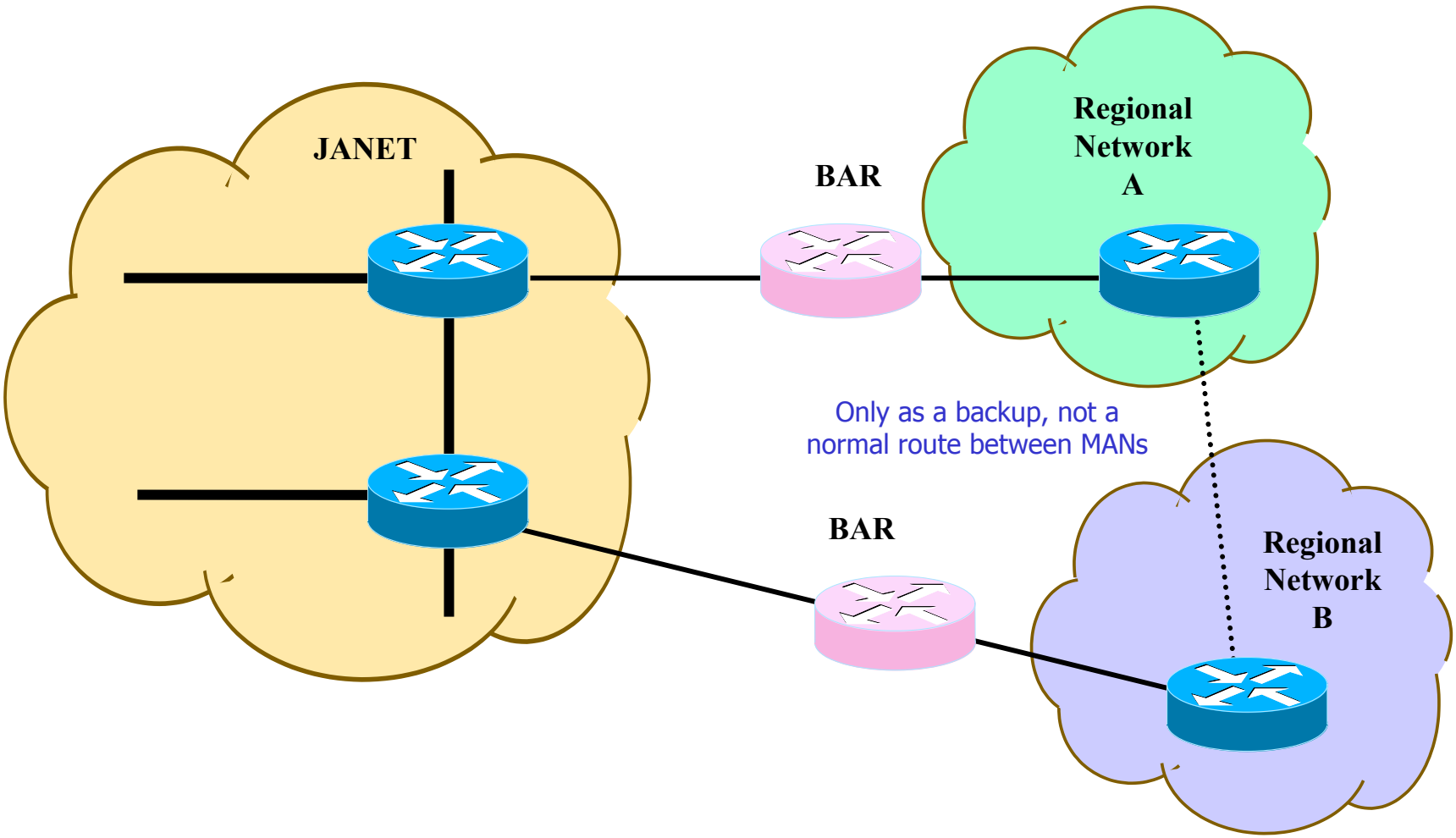


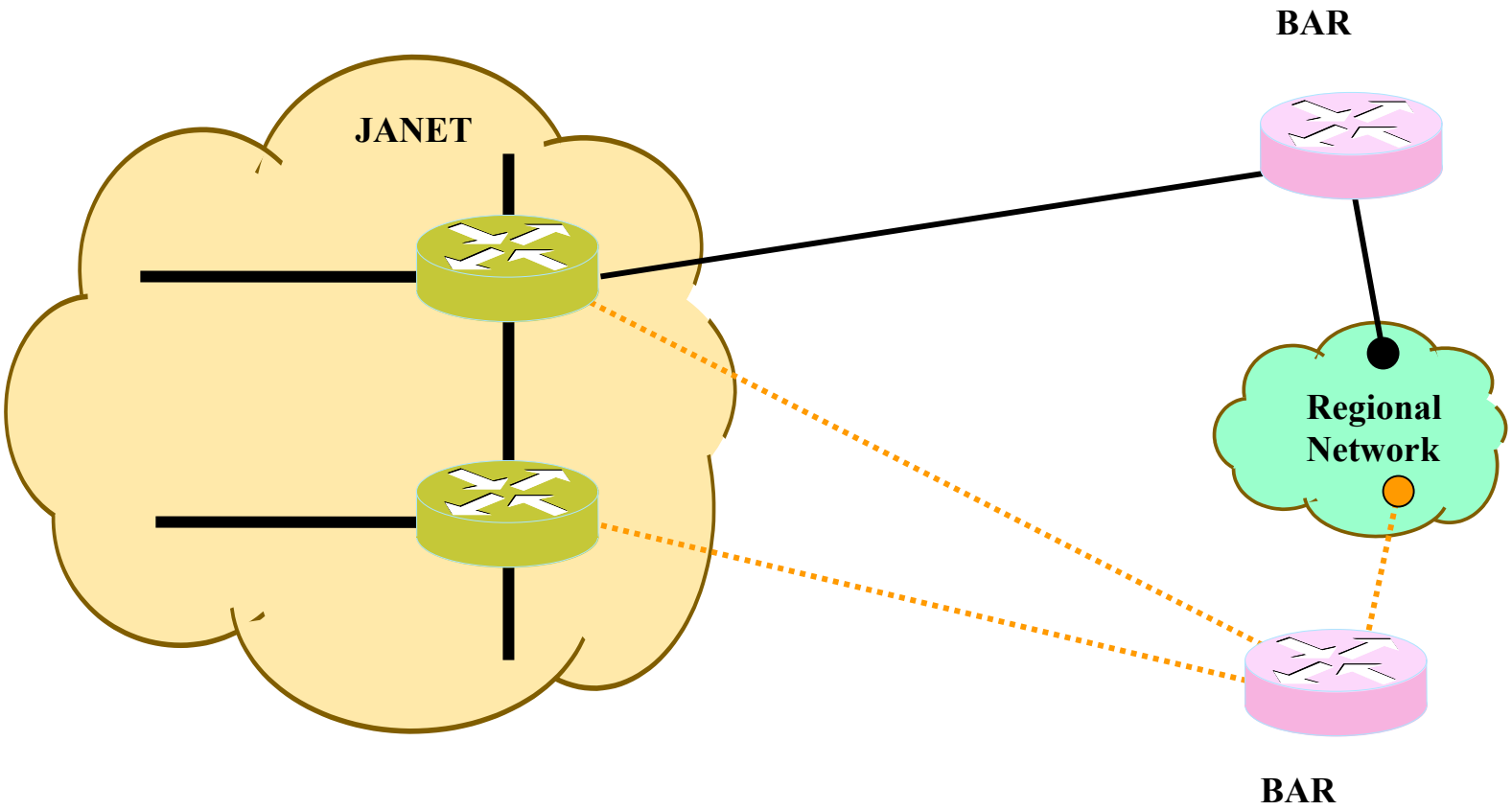
# Caveat-1


JANET
BAR
Regional
Network
A
Only as a backup, not a
normal route between MANs
BAR
Regional
Network
B

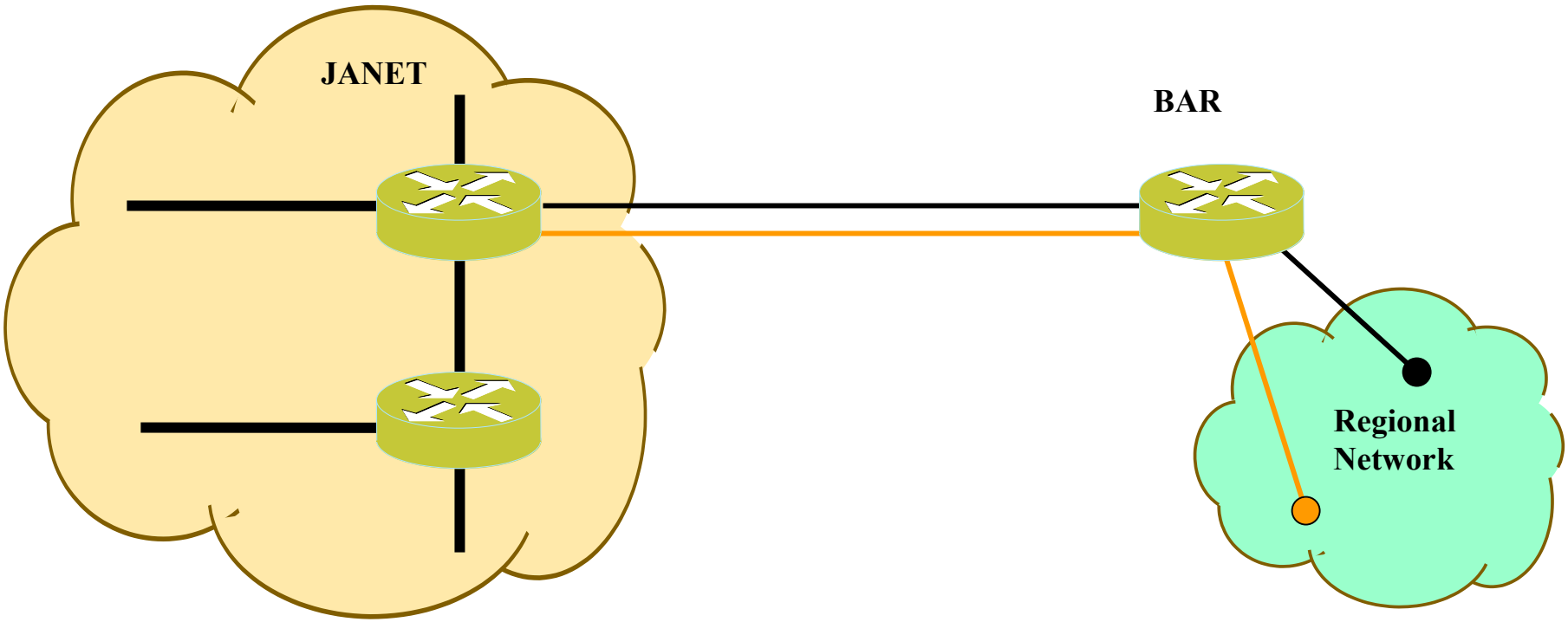
# Reliable connections to JANET core

- 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