

# Results of the Network Performance Survey

**The aim of the survey** was to have up-to-date information about the JANET community's requirements for network performance.

**The intended survey audience** was network administrators, IT support staff within JANET-connected organizations, and end users.

## **Respondents:**

129 answers have been received.

Most responses came from FE colleges; then the HE sector; quite a few responses were from RSCs, RNOs and local authorities.

## **Conventions used in the text:**

- Results are mostly given as percentages. Where this might be confusing to readers, the results are given both as a percentage and as the actual number of organisations.
- Comments on the results are given in *italic*.

## **Section 3. Performance problems experience**

The first part of the survey aimed to reflect the general experience of dealing with network performance problems: how often they happen; are there problems with detecting the cause of performance degradation; what parts of a network cause the performance problems etc.

1. 44% of respondents (57 out of 129) think they experienced problems with application performance degradation caused by network congestion or capacity problems.

The problem with identifying the cause of application degradation is illustrated by the fact that 25% (31) of respondents admitted to cases where the cause initially seemed to be congestion but turned out to be host problems, such as duplex mode mismatch, poorly written application, server configuration problems, LAN (not WAN) congestion, viruses and spyware.

69% of respondents (89) use different tools for network monitoring and troubleshooting: HP OpenView, Cisco Works, Network Instruments Observer, HP ProCurve Manager, MRTG, PRTG, NetSight, Statscout, Ethereal and others.

2. 70.5% of respondents (91) specified which areas contributed to network performance problems. These areas are:
  - a. Site LAN: 44% (40) out of those who answered this question
  - b. Link between remote and central sites: 42% (38)
  - c. General Internet congestion: 34% (31)
  - d. Network bandwidth limitations at remote site: 31% (28)
  - e. Server problems at remote site: 26% (24)
  - f. Low capacity links to satellite sites: 25% (23)
  - g. Uplink to the Regional Network: 24% (22)
  - h. Campus backbone: 23% (21)

- i. Transatlantic link congestion: 12% (11)
  - j. Regional Network: 6% (5)
  - k. Other intercontinental link congestion: 4.4% (4)
  - l. JANET backbone: 2% (2)
  - m. Other: virus attack, DNS lookup, proxy performance, DoS attack affecting JANET backbone equipment; CPU utilisation of gateways; connections to other European sites (non-academic) and networks, where traffic crosses the Atlantic twice due to US peering.
3. 34% (44) of respondents know what applications cause congestion. The most common applications named are:
- a. Web browsing: 10
  - b. Peer-to-peer (P2P) downloads (BitTorrent and others): 7
  - c. Large file transfers (radiography images, iso files etc): 6
  - d. Streaming media (Internet radio etc): 5
  - e. Database applications: 4
  - f. Skype: 2
4. 36% (43) of respondents answered the question “Are there applications you'd like to run, but feel you can't because of real or perceived network limitations?”. Applications named by the vast majority of respondents are multimedia (video and voice) streaming, VoIP and videoconferencing. Some respondents specified more particular cases and conditions of such applications, e.g. videoconferencing (at higher bandwidths) to schools on lower capacity links. Applications named only once by respondents were higher bandwidth streaming, VoIP / videoconferencing to a poorly networked location on campus LAN, very high quality AccessGrid conferencing, Active Directory, multiple VPN connections and security cameras.
5. 78 respondents specified applications whose traffic they would like to be treated with a **HIGHER** priority if such an opportunity existed.
- a. VOIP, videoconferencing and streaming media were named by the vast majority of those who specified applications.
  - b. Applications named by a few respondents are:
    - i. Email
    - ii. E-learning traffic (e.g. Learn Direct courses. VLE Frontier courses)
    - iii. Network management traffic
    - iv. DNS lookups
    - v. File servers
    - vi. Network directory synchronisation
    - vii. Important Internet traffic with exam boards, for example
    - viii. Domain log on information
    - ix. Anti virus updates
    - x. P2P downloads
    - xi. Online access control

- xii. Remote control (telnet, SSH)
  - xiii. EBS (*distance learning*), e-Fin (*finance application*), CelCat (*scheduling and student tracking tool*)
  - xiv. GOLA, Edexcel (online testing systems)
8. 61 respondents specified applications whose traffic they would like to be treated with a LOWER priority if such an opportunity existed. The most frequent mentioned applications are:
- P2P downloads
  - General Internet surfing
  - Email
  - Bulky downloads (any type)
  - SAN replications
  - Software updates
  - Backups
  - Ghost (*Symantec application distribution and managing tool*)
9. 106 respondents answered the question “Do you have any concerns with network performance when the following technologies are used?”. The technologies chosen are (in descending order of number of mentions):
- a) Wireless LAN (64 out of 106)
  - b) P2P applications (58)
  - c) Low bandwidth links to satellite networks on campus (33)
  - d) Multicast (31)
  - e) Firewalls (31)
  - f) VPN (29)
  - g) IPv6 (9)
10. The responses to the question “Would a JANET advance bandwidth reservation service (i.e. a service which allows a user to reserve, in advance, some bandwidth between two end points) be useful for your organisation?” were split: 28 respondents (out of 128) said ‘Yes’ and 34 respondents said ‘No’, while 54 don’t know the answer. ‘Others’ answers give us some reasons behind ‘Yes’ and ‘No’: “Possibly better integrated with application bookings e.g. video conferences”; “Cannot see it being useful as the mgmt overhead would be too great”; “The College uses a small part of the present system. I cannot see how this would grow within the next few years unless the College were to use video and multimedia more extensively”; “Possibly - we have some users with an interest in Grid computing and high speed networking research, with collaborators at other UK institutions”.

11. 14% of respondents (19) are aware of bulky or sustained data transfers in or out of their site which may be interfering with general user experience of the network.
  
12. Only 11 respondents answered the question “If you are aware of any bulky or sustained data transfers, please specify”. The transfers specified are: P2P filesharing, media downloads, student downloads, GRID transfers, radiography image transmission, SQL transfers, Internet radio, downloading of patches.

#### **Section 4. Specific application performance**

13. Question 13 asked about the usage and performance of several specific applications.

- Applications in use are:
  - i. Email: 109 of respondents specified that the application is in use
  - ii. Web based services (e.g. web access to the central database): 99
  - iii. Remote logins/control (e.g. ssh, telnet, vnc, X-Window sessions): 88
  - iv. Large file downloads (e.g. downloading multimedia data): 84
  - v. Caching web/multimedia content: 63
  - vi. Live videostreaming (e.g. Internet TV): 46
  - vii. Desktop videoconferencing (e.g. NetMeeting or MSN Messenger): 42
  - viii. JANET Videoconferencing (JVCS) service: 35
  - ix. P2P applications: 33
  - x. Campus IP Telephony (e.g. Cisco Call Manager based): 32
  - xi. Remote backup: 32
  - xii. Desktop IP Telephony (Skype-like): 28
  - xiii. Campus videoconferencing (i.e. campus wide and campus managed): 27
  - xiv. Access GRID: 16
  - xv. E-Science bulky data transfer: 14
  - xvi. Commercial provider IP Telephony: 5
  - xvii. Commercial provider videoconferencing: 2
  
- Mission critical applications:
  - i. Email: 102
  - ii. Web based services: 78
  - iii. Remote logins/control (e.g. ssh, telnet, vnc, X-Window sessions): 42

- iv. Caching web/multimedia content: 31
- v. Remote backup: 28
- vi. Campus IP Telephony (e.g. Cisco Call Manager based): 25
- vii. Large file downloads (e.g. downloading multimedia data): 16
- viii. JANET Videoconferencing (JVCS) service: 8
- ix. Campus videoconferencing (i.e. campus wide and campus managed): 8
  - x. E-Science bulky data transfer: 7
  - xi. Commercial provider IP Telephony:5
  - xii. Access GRID: 4
- xiii. Live videostreaming (e.g. Internet TV): 3
- xiv. Desktop videoconferencing (e.g. NetMeeting or MSN Messenger): 2

➤ Usage level:

- i. Email: Universal
- ii. Web based services: Medium
- iii. Remote logins/control (e.g. ssh, telnet, vnc, X-Window sessions): Light
- iv. Caching web/multimedia content: Medium
- v. Remote backup: Medium
- vi. Campus IP Telephony (e.g. Cisco Call Manager based): Light
- vii. Large file downloads (e.g. downloading multimedia data): Medium
- viii. JANET Videoconferencing (JVCS) service: Light
- ix. Campus videoconferencing (i.e. campus wide and campus managed): Light
  - x. E-Science bulky data transfer: Light/Medium
  - xi. Commercial provider IP Telephony:Light
  - xii. Access GRID: Light
- xiii. Live videostreaming (e.g. Internet TV): Light
- xiv. Desktop videoconferencing (e.g. NetMeeting or MSN Messenger): Light

➤ How often is it affected by network?

- i. Email: Never (43 respondents) /Sometimes (51) / Often (1)

- ii. Web based services (e.g. web access to the central database): Never (48) / Sometimes (54) / Often(4)
- iii. Remote logins/control (e.g. ssh, telnet, vnc, X-Window sessions): Never(21) / Sometimes (16) / Often (2) / Almost always (1)
- iv. Large file downloads (e.g. downloading multimedia data): Never (29) / Sometimes (44) / Often (5) / Almost always (1)
- v. Caching web/multimedia content: Never (28) / Sometimes (30) / Often (3)
- vi. :Live videostreaming (e.g. Internet TV): Never (18) / Sometimes (23) / Often (4)
- vii. Desktop videoconferencing (e.g. NetMeeting or MSN Messenger): Never (10) / Sometimes (16)
- viii. JANET Videoconferencing (JVCS) service: Never (21) / Sometimes (16) / Often (2)
- ix. P2P applications: Never (11) / Sometimes (16) / Often (3)
- x. Campus IP Telephony (e.g. Cisco Call Manager based): Never (14) / Sometimes (13)
- xi. Remote backup: Never (19) / Sometimes (15)
- xii. Desktop IP Telephony (Skype-like): Never (10) / Sometimes (16)
- xiii. Campus videoconferencing (i.e. campus wide and campus managed): Never (14) / Sometimes (13)
- xiv. Access GRID: Never (6) / Sometimes (9) / Often (1) / Almost always (1)
- xv. E-Science bulky data transfer: Never (10) / Sometimes (9) / Often (0) / Almost always (1)
- xvi. Commercial provider IP Telephony: Never (5) / Sometimes (4) / Often (1)
- xvii. Commercial provider videoconferencing: Never (5) / Sometimes (1)

## **Section 5. Your organisation and network**

15. 53 of the respondents represent FE colleges; 39 – HE sector; 2 – schools and community network for schools; 2 – RNO; 2 – Adult and Community Learning; 2 – Research Institutions; 1 – RSC; 2 – local authority; 3 – Six Form Colleges. Others didn't specify the type of their organisation.
16. Many respondents (30% or 34 organisations) have rather slow access links to JANET/Regional Network with speeds in the 10-16 Mbit/s range; almost 20% (22 respondents) have very slow access links with speeds less than or equal to 4 Mbit/s. In total, 50% of the organisations which participated in the survey have low speed connections. At the same time the other half of the respondents have medium or high speed access links: 29 respondents have speeds in the 33-155 Mbit/s range and 20 have over 622 Mbit/s.
17. Most respondents use Cisco routers and switches as an edge device connecting them to JANET. Others' vendors are: Foundry, Extreme, Enterasys. Some respondents specified firewalls as their edge devices: Nokia, NetScreen, Juniper.

18. 54% of respondents manage the edge device themselves whereas 46% outsource this function (mostly using RSCs, RNOs and universities).
19. 33 organisations have an access link with less than 20% of the average load; 26 organisations have a load between 20% and 30%; 23 organisations have a load between 30% and 50%; and 18 organisations have a load greater than 50%.
20. 20 organisations experience a load greater than 50% for less than 1 hour a day; 15 organisations experience this load for between 1 and 3 hours a day; and 26 organisation experience this load for more than 3 hours a day.
  
21. Multicast is enabled on 42 organisation networks and it will be deployed on 10 more networks soon. 21 respondents don't know the state of multicast on their networks.
22. 32 respondents know that the Regional Network they are connected to supports multicast; 10 respondents know that their Regional Network doesn't support multicast; 70 respondents doesn't know whether their Regional Network supports multicast or not.
23. Most respondents (87) think that their organisations configure/maintain their network themselves. 18 respondents think that their organisation partly outsources this job.
24. The question "How many people work full time on networking in your institution" gave the following results:
  - About one full time post: 26
  - 3-5 full time posts: 24
  - More than 5 full time posts: 18
  - Less than half a full time post: 17
  - Half a full time post: 12

## **Section 6. Quality of Service (QoS) implementation**

25. The majority of respondents (86) consider QoS as "**A useful mechanism for treating different kinds of traffic**"; 18 respondents see it as "a niche technology, which has or will have very limited deployment"; only 9 respondents see it as "Unnecessary network intelligence which is pushed by equipment vendors to sell more."
  
26. 64 organisations didn't deploy QoS and 14 of them are not going to deploy it in the future; however, 20 of them are considering whether to deploy it shortly and another 30 are considering whether to deploy it in the future.

Fewer organisations have already deployed QoS: 9 deployed QoS "universally throughout the campus according to site policy" and 18 did it "partly in ad-hoc fashion to fire-fight the problems of some application".

Organisations that deployed QoS universally are: University of Salford, CEH Lancaster, Warwickshire college, Wrexham County Borough Council, University of Gloucestershire, Bridgwater College, University of Exeter, Barnet College. 1 organisation preferred to be anonymous.

27. The question was: “If your organisation has deployed QoS already, what was the reason?” and we have received more answers (45) than organisations which have deployed QoS (27) according to the answers to Q26. It seems that some respondents who are going to deploy QoS shortly or in the future also answered this question.

The reasons for QoS deployment:

- To support VoIP (29)
- To support videoconferencing (14)
- To support videostreaming
- To protect applications against bulky data transfer, e.g. against remote backups

28. 9 respondents answered that they see QoS working OFTEN (8 of them deployed QoS universally); 16 respondents – SOMETIMES; 12 – VERY RARE; and 10 – NEVER.