IT provision onboard NMF-operated NERC ships

Overview

The following table provides a summary of the information technology provision on both the RRS *James Cook* and RRS *Discovery* under standard operating conditions.

Satellite internet links	1 x C-Band VSat (Primary, 3 Mbps) 1 x BGAN Fleet Broadband (Backup, 0.256 Mbps)
Upload speed	1.5 Mbps (~183 KB/sec)
Download speed	1.5 Mbps (~183 KB/sec)
Download burst speed	Upto 10 Mbps (~1.2 MB/sec)
Max upload/download time	*1 photo (~5MB)* ~ 30 seconds *1 photo per person onboard (~250 MB)* ~ 20 minutes *10 min video @ 240P* ~ 2 minutes 30 seconds *10 min video @ 1080P HD* ~ 25 minutes *1 gigabyte* ~ 1 hour 30 minutes
Video conferencing / livestreaming support	Can support 1 video call (e.g. Skype) or livestream (e.g. YouTube) session at any one time consuming up to 1.2 Mbps of each upload and download bandwidth.
Telephone lines	4 x UK phone lines over satellite, shared to all cabins and workspaces. Free to receive calls from off-ship, phonecard required to make non-business calls off-ship.
Access management	Optimised for business use; some usage management in place to regulate personal use.
Wi-Fi access	*Working Areas* Available, managed access *Bar / Lounge* Available, open access *Accommodation* Not available
Wired access	*Working Areas* Available, managed access *Bar / Lounge* Available, managed access *Accommodation* Available, managed access
Open internet access	Available to key business users (Master, Chief Engineer, Chief Mate, Purser, Chief Scientist and Senior Technician). Available on 10 public machines throughout the ship. Available on the Wi-Fi in the Bar and Lounge areas. Negotiable depending on performance and requirements.
Intranet	Digital notice board for Master, Purser and Chief Scientist, news feed (BBC, Guardian, Metro), weather service, live data feeds.
File storage and sharing	1 x Public shared folder, 1 x Read-only cruise data archive. Up to 48TB storage (6TB primary + 7 x 6TB backup).

Internet link over satellite

It is prohibitively expensive and technically challenging to provide an internet link at sea via satellite to a speed and reliability equivalent to that ordinarily found in most workplaces.

The internet provision on our ships is reasonable compared to other ships, but compared to a normal workplace it is around 50 times slower: the speed of 1.5Mbps shared between 50 people onboard, is the recommended[1] speed that would be allocated *per employee* in a land-based workplace!

In order to provide a usable service on this limited bandwidth, a mix of access- and use-management techniques are employed onboard. Business traffic is prioritised through the configuration of the ships' routers and different levels of usage restriction are in operation to enable key users to use the internet with minimum disruption.

Recognising however, that connectivity for personal use is of immense value to most people, WhatsApp and email are enabled to all devices and unrestricted Wi-Fi access is provided in the ships' recreational areas.

The balance of restrictions is negotiable with the Master and ship's Science Systems Technician in order to adapt the provision to different use requirements, events or performance issues.

As our satellite link is shared with other ships in the satellite's footprint, users can enjoy higher download (not upload) speeds during periods when traffic from other ships is less.

Managed access

Personal devices for most of the science party (excepting the Chief Scientist) may be subject to usage restrictions, unless used in the Bar or Lounge. This may restrict access to a 'whitelist' of institutional, cruise-specific or business websites and the ship's intranet or slow down access to non-whitelist websites.

Bandwidth-intensive applications such as video streaming, gaming, file sharing (like Dropbox, OneDrive), some cloud services and VPN connections are blocked or severely restricted for all users.

Websites in categories deemed to be in breach of the NERC IT Policy are blocked.

IT Infrastructure

Computers

Most scientists, technicians and crew will use their own devices. But in case they are required, there are ten open-access computers around the ship available for general use. In addition, there is one high-performance computer loaded with the CARIS multibeam-processing software for hydrographic use.

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[1] https://leapfrogservices.com/how-much-internet-speed-do-you-need-data-speeds-deciphered/

Virtual machines

The ship is fitted with VMware high-performance virtual machine host servers. If there is a particular computing environment you would like onboard, it is possible to supply us with the virtual machine image or deployment template and your computing environment, with which we can set up your environment.

File servers

The ship is fitted with primary and backup network allocated storage (NAS) units offering up to 40TB primary data storage or 6TB primary storage with 7 days' backup. The cruise scientific data is aggregated into a central store which is made available across the ship as a read-only folder share. The data store also exposes a public read/write share that can be used a general file store and sharing area for all the embarked scientists.

The data is further copied to external USB storage volumes to hand over to the Chief Scientist at the conclusion of the cruise. Generally, 2TB external data storage is sufficient for most cruises.

Onboard support

IT support is one of the roles played by the ship's Science System Technician, drawn from the NMF Ship Scientific Systems team at the National Oceanography Centre.

They support the full suite of ship-fitted scientific systems, from the underway and meteorological sampling, gravity, magnetics, multibeam and other echosounders through to the data acquisition systems and IT infrastructure. They will be your first point of contact concerning your IT requirements and getting your devices working on the ship.

Advice to joining scientists

1. **Don't bring a computer virus.** Ensure you have an up-to-date virus scanner and firewall installed on devices you bring onto the ship. Make sure you have run scans before joining the ship's network. Failure to do so may, in the worst case, lead to an infection which cripples the ship's IT infrastructure, potentially causing the loss of any data collected during that cruise.
2. **Install all software updates before joining.** Most personal devices require regular updates and some applications on them will stop working properly if not updated for long periods of time. Ensure you have installed all vital App and operating system updates on your phone or laptop prior to joining as update servers are blocked on the ship.
3. **Install an email client on your phone or laptop.** Using an App such as Outlook, Thunderbird or Apple Mail to download your email to your device uses less bandwidth and is quicker than using web-based email access like Office 365.
4. **Download vital web-based files before joining.** If you need access to web-based manuals, science papers, datasets that are critical for your work at sea, it is recommended to download them to your computer before joining the ship.
5. **Bring backups of software you need.** If a piece of software is critical to your work at sea – such as for operating microscopes, sampling devices or sensors – make sure you bring the means to reinstall it: such as installation media on a CD or USB drive.

6. **Temporarily disable two-factor authentication on your email accounts.** As the internet connection is sometimes routed over two different satellite uplinks, email services like Hotmail, Gmail and IPhone may block access to your email account until you authenticate with a code sent to your device by SMS. At sea you cannot receive SMS, so you can end up in a situation where you are locked out of your email until you get ashore. Search for instructions for how to disable two-factor authentication:

   a. Hotmail: https://www.google.co.uk/search?q=disable+two+factor+authentication+hotmail
   b. Gmail: https://www.google.co.uk/search?&q=disable+two+factor+authentication+gmail
   c. IPhone: https://www.google.co.uk/search?q=disable+two+factor+authentication+iphone

If you need help with any of these prior to joining, please contact your IT department. On the ship, please see the Science Systems Technician.