
**ENGINEERING &
LOGISTICS REPORT**

Establishment of Structured Local Area Network at Maitri

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Point to point C band SATCOM link between NCAOR, GOA and MAITRI, Antarctica was established in XXVII Indian Scientific Expedition to Antarctica by Satellite Application Centre (SAC), Electronics Corporation of India Limited (ECIL) and Expedition members. This had opened the way to connect MAITRI station with mainland, with a mandate to reduce communication time, NCAOR has planned to extend link by establishing Local Area Network (LAN) at MAITRI.

A LAN is a high-speed, fault-tolerant data network that covers a small area and this was suitable for MAITRI station and surrounding. Typically workstations, personal computers, printers, and scientific equipments were connected with LAN technology. LANs offered users to share access to devices and applications, file exchange between connected users, and communication between users via electronic mail and near real time data transfer to mainland NCAOR.

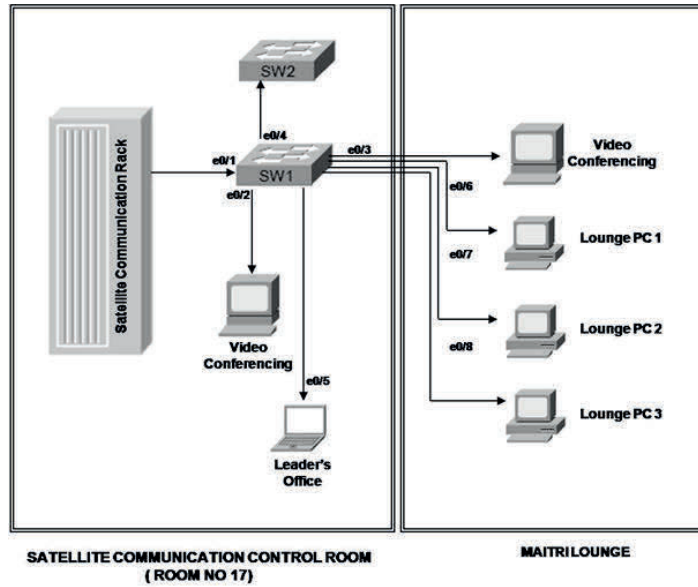
LAN topologies define the manner in which network devices are organized. Four common LAN topologies exist: bus, ring, star, and tree. These topologies are logical architectures, but the actual devices need not be physically organized in these configurations. Logical bus and ring topologies, for example, are commonly organized physically as a star. A bus topology is a linear LAN architecture in which transmissions from network stations propagate the length of the medium and are received by all other stations. Some networks implement a local bus topology. A ring topology is a LAN architecture that consists of a series of devices connected to one another by unidirectional transmission links to form a single closed loop. A star topology is a LAN architecture in which the endpoints on a network are connected to a common central hub, or switch, by dedicated links. Logical bus and ring topologies are often implemented physically in a star topology. A tree topology is a LAN architecture that is identical to the bus topology, except that branches with multiple nodes are possible in this case.

LAN devices commonly used in LANs include repeaters, hubs, LAN extenders, bridges, LAN switches, and routers. With the installation of these LAN devices we prevent signal deterioration caused by long cable lengths and large numbers of connected devices. Switches are used as they allocate bandwidth proportionally to each port and provide evenly distributed bandwidth to each port. Dedicated collision-free communication between network devices increases file-transfer throughput. Due to all these advantages and expansion options in future, switches are used for MAITRI networking using combination of star and tree topology.

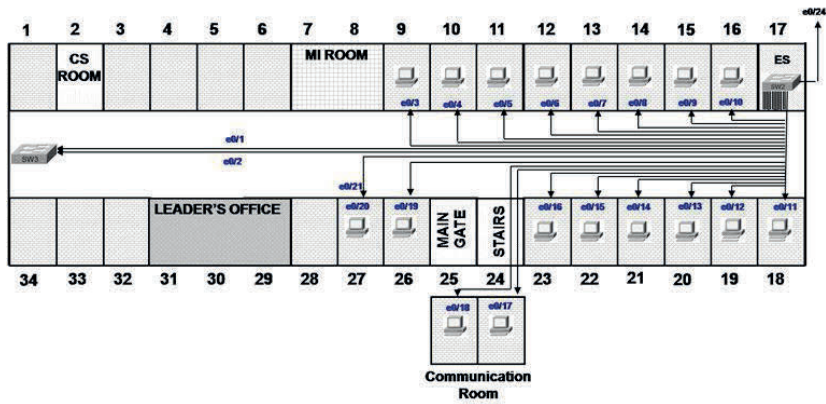
Category 6 cables UTP/ STP was properly installed and terminated at each node to meet desired communication specifications of MAITRI station. Due care was taken to avoid any kink or tight bend (the bend radius should be at least four times the outer diameter of the cable). The wire pairs must not be untwisted and the outer jacket must not be stripped back more than 1/2" (25 mm). When used for 10/100/1000BASE-T, the maximum allowed length of a Cat 6 cable is up to 100 meters (328 ft). For length near or more then 100 meter CAT 6 STP cable was used and final horizontal length was kept at 90 meters (295 ft), between the patch panel and the wall jack, 1 and 3 meters of stranded patch cable are attached to various device.

Extra cable shielding was required in order to improve a Cat 6 cable's performance in high electromagnetic interference (EMI) environments as well as due to cold and harsh Antarctic climate. Shielding is typically maintained from one cable end to the other using a thick drain hose that runs through two feet deep trench. Extra cables, STP cables are laid for outside connectivity between any two laboratories outside Maitri Station.

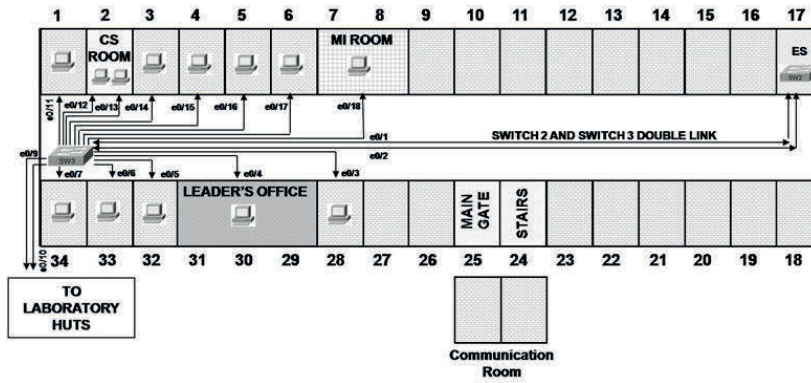
Maitri Station is completely divided in three segments by three switches marked as SW1, SW2 and SW3. SW1 switch was used to link C-band SATCOM Link to LAN network of MAITRI and only common facilities are terminated (Like Video Conferencing) with extension to SW2 switch. SW2 and SW3 switches are the main distribution switches, these switches provide connectivity to individual rooms and outside laboratories.



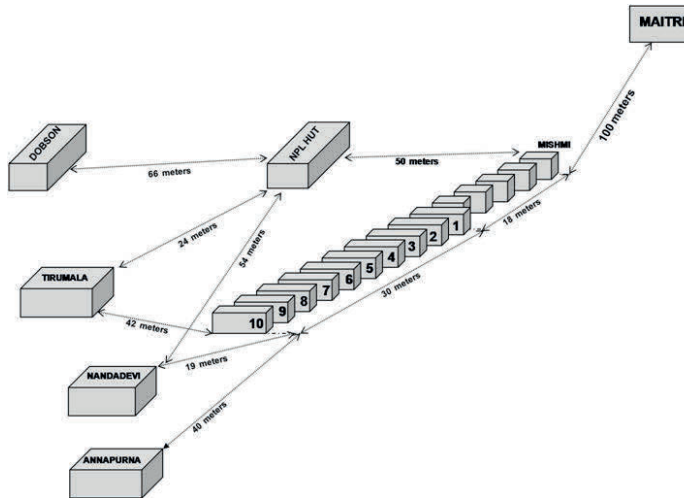
Switch 1 (SW1) 8 Port, Setup and Connectivity to Video conferencing and Language



Coverage of 24 port Switch SW2 Installed in Room No. 17



Coverage of 24 port Switch SW3 Installed in Room No. Corridor in front of Room No. 34



Connectivity between various Laboratory and Living modules with distances in between them



IT Cables running towards Maitri
