WMO GTS Procedure GTS Data formats Metadata

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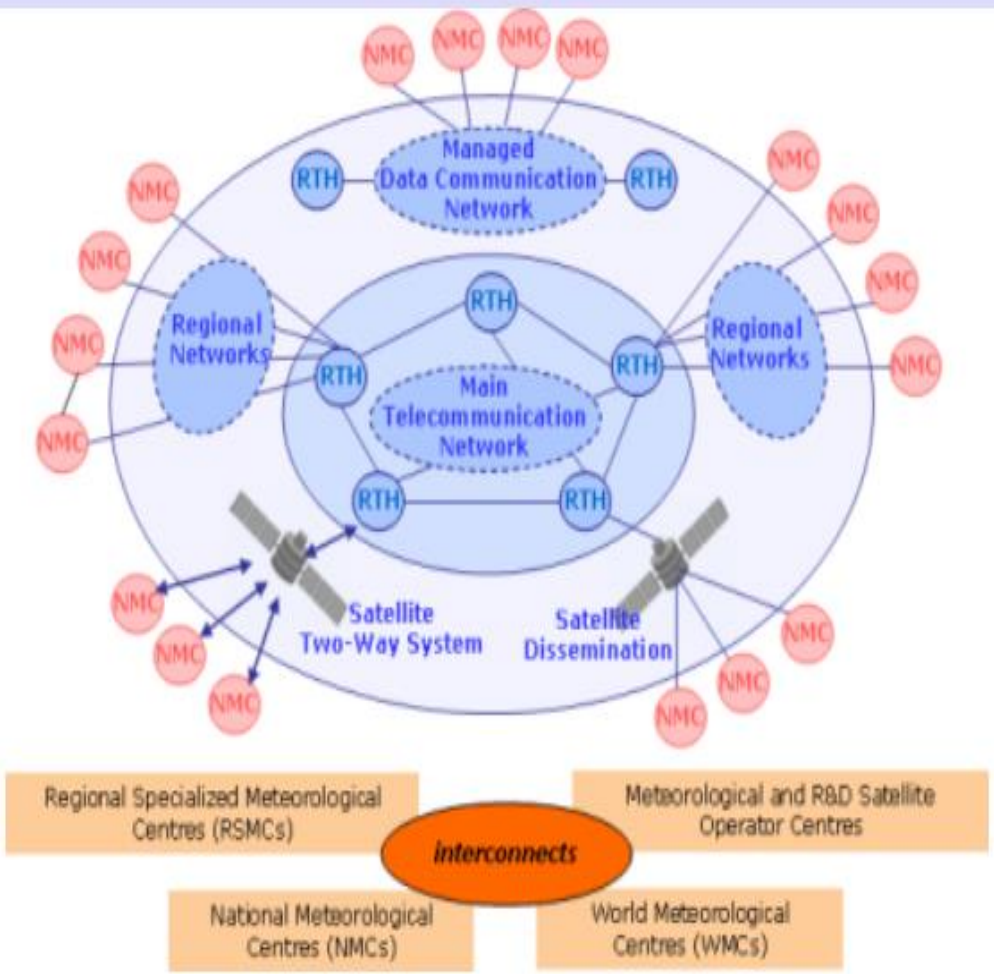
GTS

- The Global Telecommunication System (GTS) is "The coordinated global system of telecommunication facilities and arrangements for the rapid collection, exchange and distribution of observations and processed information within the framework of the World Weather Watch.“
- The GTS shall be organized on a three-level basis, namely:

(a) The Main Telecommunication Network (MTN), linking together the WMCs as well as designated Regional Telecommunication Hubs (RTHs);
(b) The regional telecommunication networks; and
(c) The national telecommunication networks.

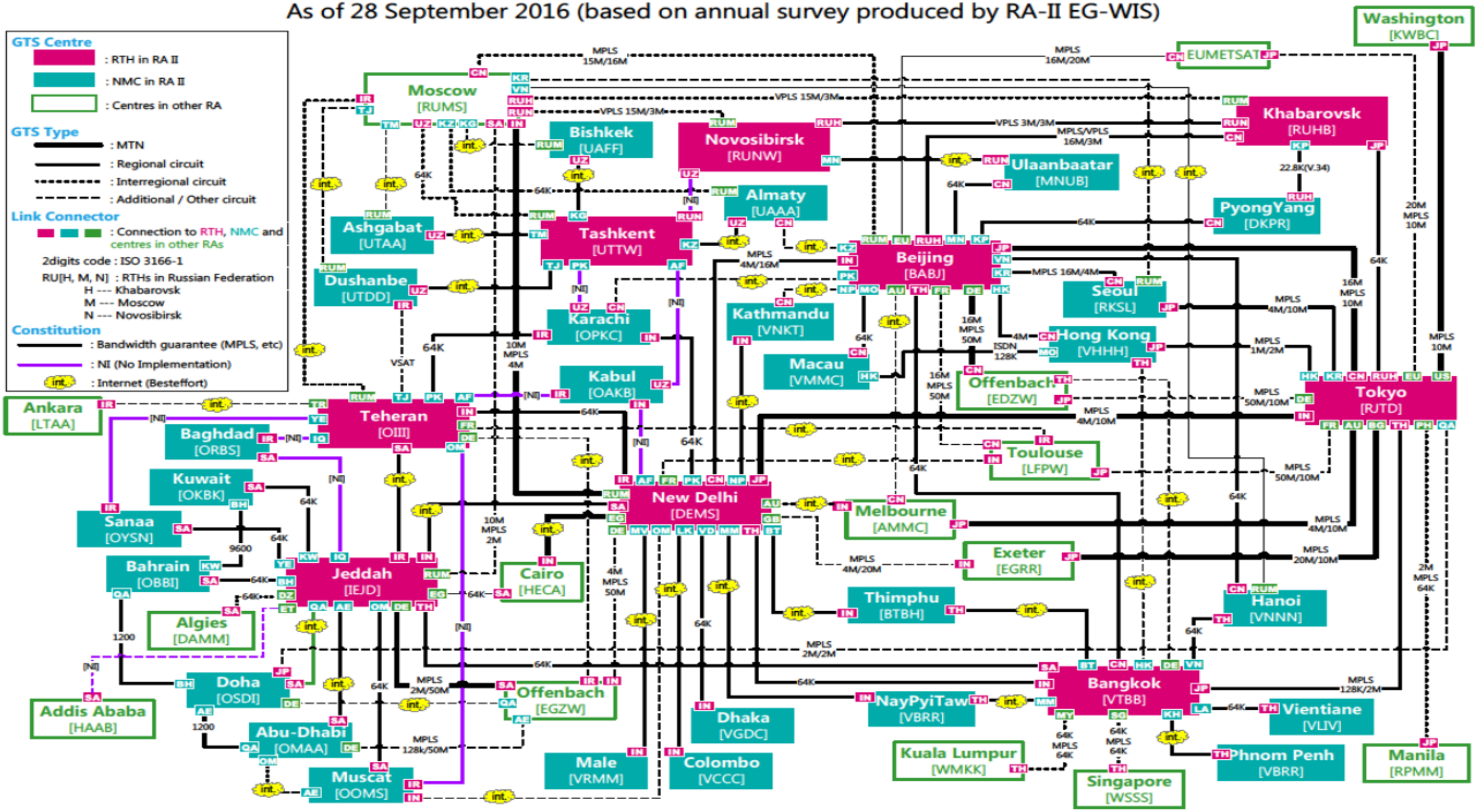
The GTS is an integrated network of surface-based and satellite-based telecommunication links of point-to-point circuits, and multi-point circuits, interconnecting meteorological telecommunication centres operated by countries for round-the-clock reliable and near-real-time collection and distribution of all meteorological and related data, forecasts and alerts.

This secured communication network enables real-time exchange of information, critical for forecasting and warning of hydrometeorological hazards



Regional Meteorological Telecommunication Network in Region II

As of 28 September 2016 (based on annual survey produced by RA-II EG-WIS)

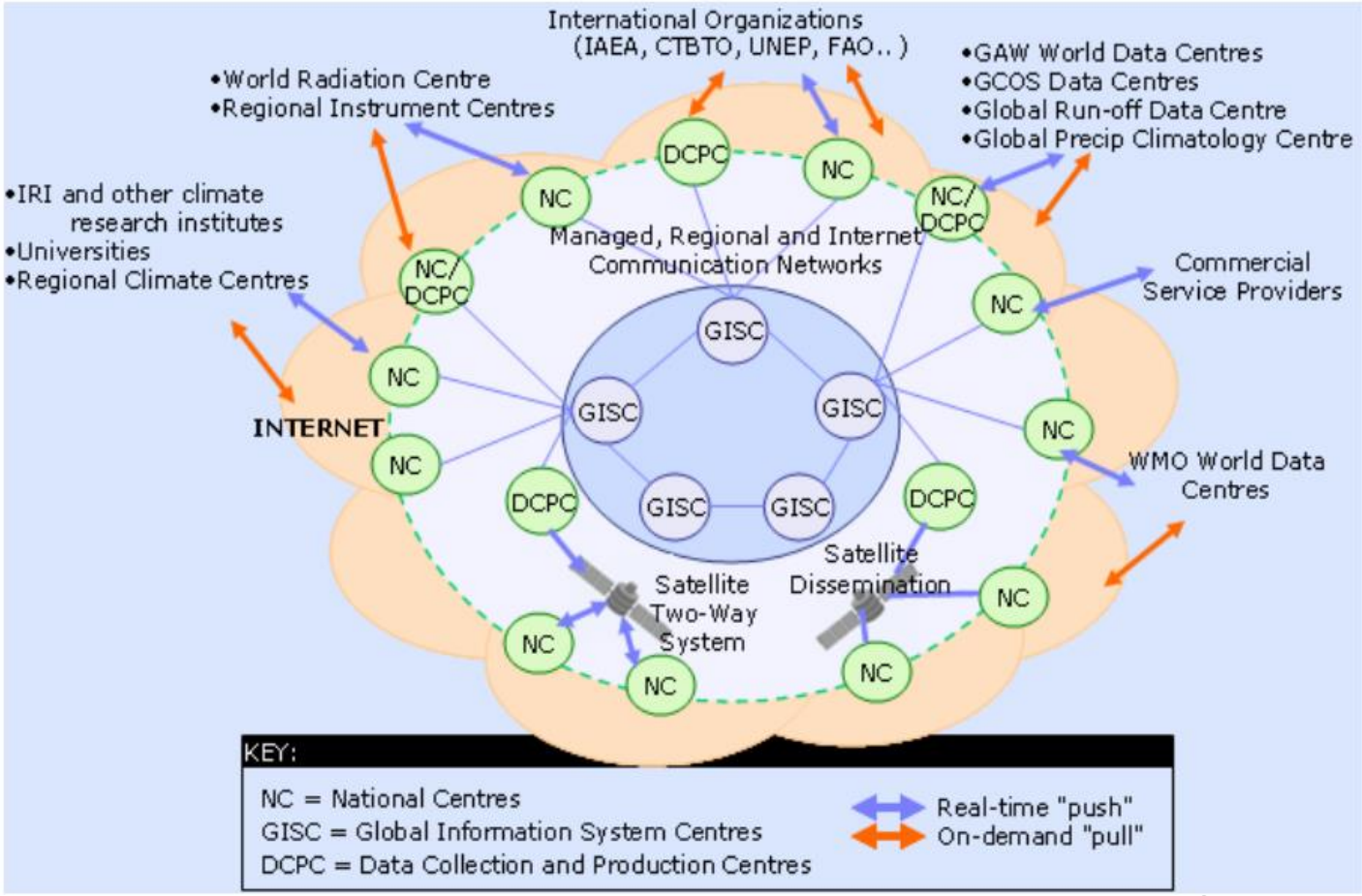


WIS (World Information System)

- The WMO Information system (WIS) is a coordinated global infrastructure responsible for telecommunications and data management functions and is owned and operated by WMO Members.
- It is capable of exchanging large data volumes, such as new ground and satellite-based systems, finer resolutions in numerical weather prediction, and hydrological models and their applications.
- WIS is a vital data communications backbone for integrating the diverse real-time and non-real-time high priority data sets, regardless of location.

WIS is composed of three types of centres and a communications network

- National Centres (NCs)
- Data Collection or Production Centres (DCPCs)
- Global Information System Centres (GISCs)



Global Information System Centres (GISC)

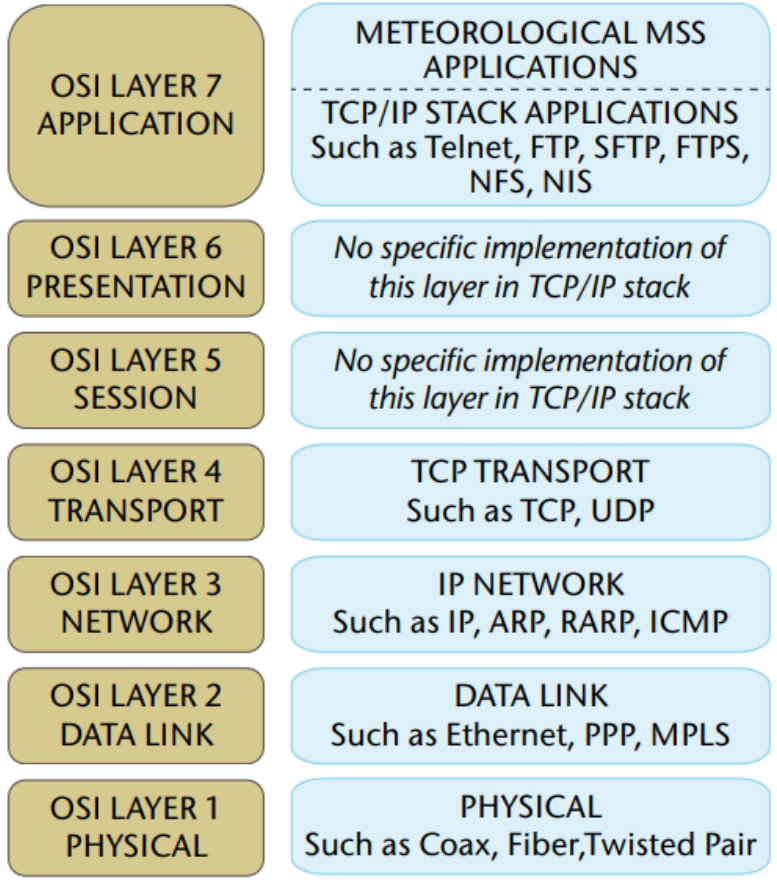
- GISCs primary role is to collect data and information from WIS contributing centres in their area of responsibility and pass information to centres in their area and send information meant for global distribution to the other GISCs.
- GISCs play a core role in the management and maintenance of discovery metadata that underlies the data management and information discovery, access, and retrieval functions of WIS.

Functions of GISC

- Receive observational data and products that are intended for global exchange from NCs and DCPCs within their area of responsibility, reformat as necessary and aggregate into products that cover their responsible area;
- Exchange information intended for global dissemination with other GISCs;
- Disseminate, within its area of responsibility, the entire set of data and products agreed by WMO for routine global exchange (this dissemination can be via any combination of the Internet, satellite, multicasting, etc. as appropriate to meet the needs of Members that require its products);
- Hold the entire set of data and products agreed by WMO for routine global exchange for at least 24 hours and make it available via WMO request/reply (”Pull”) mechanisms;
- Maintain, in accordance with the WMO standards, a catalogue of all data and products for global exchange and provide access to this catalogue to locate the relevant centre;
- Provide around-the-clock connectivity to the public and private networks at a bandwidth that is sufficient to meet its global and regional responsibilities;
- Co-ordinate with the Centres within its area of responsibility a WIS telecommunications infrastructure that can meet the WIS requirements for information exchange within the area and that can exchange agreed WIS time-critical and operational critical information with other areas.
- Ensure that they have procedures and arrangements in place to provide swift recovery or backup of their essential services in the event of an outage (due to, for example, fire or a natural disaster);
- Participate in monitoring the performance of the system, including monitoring the collection and distribution of data and products intended for global exchange.

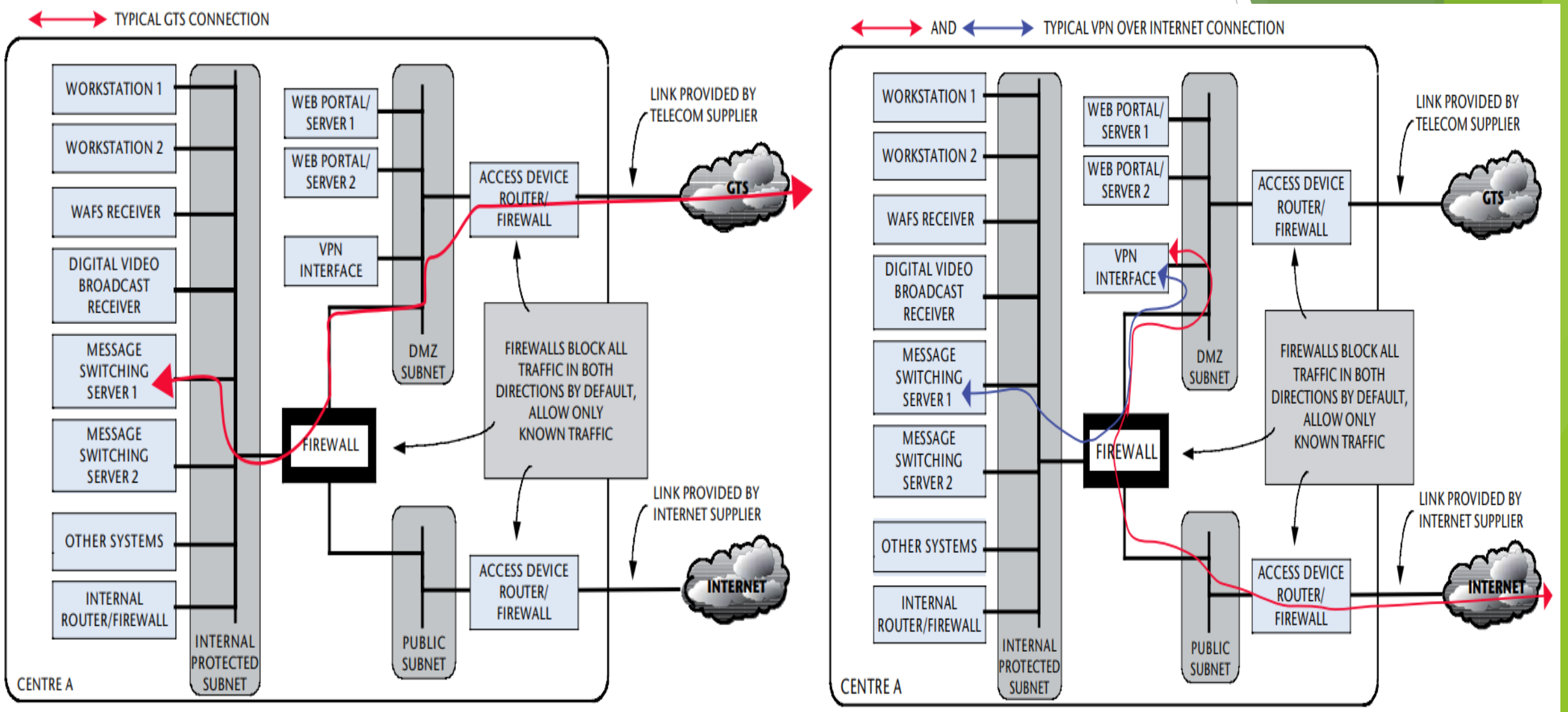
Communications Network

- *The "Core Network" connects all of the GISCs and is based on the Global Telecommunication System (GTS) Main Telecommunication Network (MTN).*
- *GISCs connect by dedicated and public networks to centres within their area of responsibility. This connectivity network is referred to as the GISC's "Area Meteorological Data Communication Network" (AMDCN) and includes using Regional Meteorological Telecommunication Networks (RMTNs) of the GTS and the Internet. This allows GISCs to distribute information to centres in their AMDCN from the global community as well as to collect and distribute information between centres in their AMDCN.*



Data flow of Traffic 1. Over IP

2. Over VPN



Message header format

$T_1T_2A_1A_2$ii Data designators.

Note: The WMO standard data designators are given in Attachment II-5.

T_1T_2 Data type and/or form designators.

A_1A_2 Geographical and/or data type and/or time designators.

ii It shall be a number with two digits. When an originator or compiler of bulletins issues two or more bulletins with the same $T_1T_2A_1A_2$ and CCCC the ii shall be used to differentiate the bulletins and will be unique to each bulletin.

CCCC International four-letter location indicator of the station or centre originating or compiling the bulletin, as agreed internationally, and published in *Weather Reporting* (WMO-No. 9), Volume C1 – Catalogue of Meteorological Bulletins.

YYGGgg International date-time group.

BBB An abbreviated heading defined by $T_1T_2A_1A_2$ ii CCCC YYGGgg shall be used only once. Consequently, if this abbreviated heading has to be used again for an addition, a correction or an amendment, it shall be mandatory to add an appropriate BBB indicator, identified by a three-letter indicator which shall be added after the date-time group.
The BBB indicator shall have the following forms:
RR_x for additional or subsequent issuance of bulletins;
CC_x for corrections to previously relayed bulletins;
AA_x for amendments to previously relayed bulletins;

The specifications of the abbreviated headings of addressed messages are the following:

$T_1T_2A_1A_2$ii $C_aC_aC_aC_a$ YYGGgg (BBB)
T_1T_2 = BM, designator for addressed messages in alphanumeric form;
T_1T_2 = BI, designator for addressed messages in binary form;
A_1A_2 = AA, administrative message
BB, service message
RR, request of GTS messages
RQ, request-to-database
DA, data message
ii = 01

$C_aC_aC_aC_a$ = location indicator of the addressed centre
YYGGgg = time of insertion on the GTS.

Data available with NDC (National Data Centre) Pune

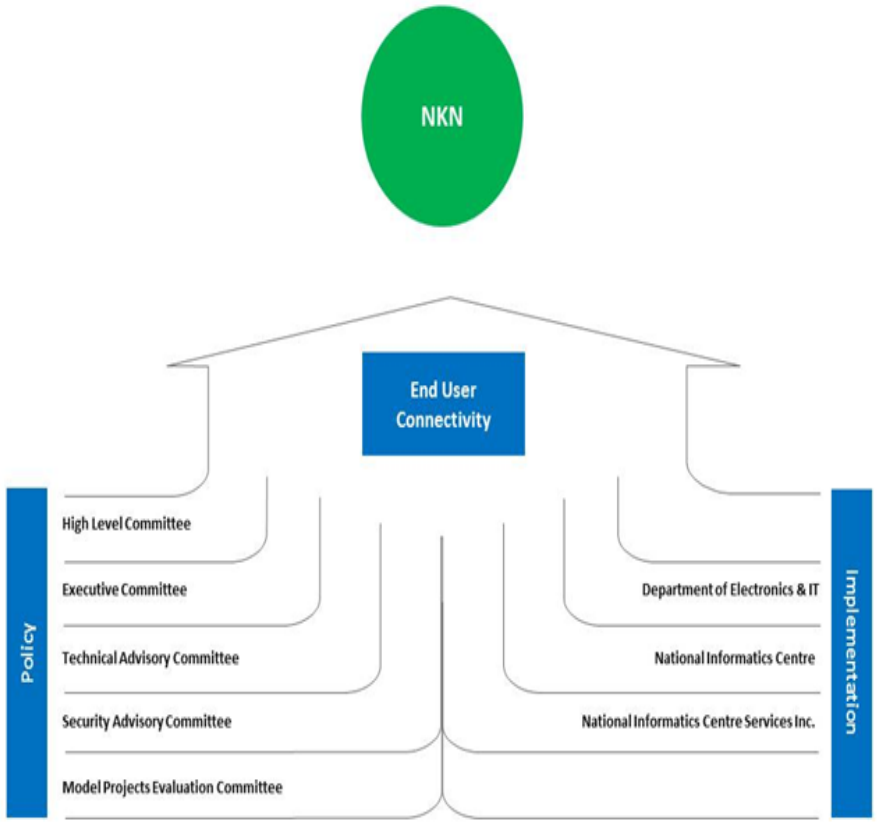
Table 1: Atmospheric data availability in the archives of National Data Center (NDC). The availability of a particular parameter depends upon its year of start of recording.

Data type	Data frequency	Availability (year onwards)	Parameters
AWS-SYNOP	Hourly	2007	Atmospheric pressure, Air Temperature, Dew point temperature, Rainfall, Wind (Direction and Speed), Sunshine hours
SURFACE	Daily	1969	Atmospheric pressure, Air temperature, Dew point temperature, Humidity, Vapour Pressure, Evaporation, Rainfall, Wind (Direction and Speed), Sunshine hours, Visibility, Weather phenomenon
SURFACE	Monthly	1901	Atmospheric pressure, Air temperature, Dew point temperature, Humidity, Vapour Pressure, Evaporation, Rainfall, Wind (Direction and Speed), Sunshine hours, Visibility, Weather phenomenon
RAINFALL	Daily, Weekly, Monthly	1875	Rainfall
UPPER AIR	Daily, Monthly	1951	Air Temperature, Dew Point Temperature, Wind (Direction and speed)
AUTOGRAPHIC	Hourly	1969	Atmospheric pressure, Air temperature, Humidity, Wind speed, Pressure, Rainfall, Sunshine
MARINE	Hourly	1961	Atmospheric pressure, Air temperature, Dew point temperature, Sea surface Temperature, Present and past weather, Wind (Direction and Speed), Visibility, Clouds, Wind wave, Swell wave
AGROMET	Hourly	1972	Air Temperature, Wet bulb temperature, Relative humidity, Vapour Pressure, Evaporation, Evaporation transpiration, Rainfall, Wind (Direction and Speed), Sunshine hours, Atmospheric pressure, Soil temperature, Soil moisture
RADIATION	Hourly	1957	Global, Diffused, Direct, Net, Terrestrial
TURBIDITY	Daily	1980	Turbidity
OLR	Daily	1987	Outgoing Longwave Radiation
OZONE	Weekly	1980	Ozone

NKN(National knowledge Network)

- National Knowledge Network (NKN) project is aimed at establishing a strong and robust Indian network which will be capable of providing secure and reliable connectivity. Globally, frontier research and innovation are shifting towards multidisciplinary and collaborative paradigm and require substantial communication and computational power. In India, NKN with its multi-gigabit capability aims to connect all universities, research institutions, libraries, laboratories, healthcare and agricultural institutions across the country to address such paradigm shift.
- In order to improve access to knowledge, a need has been long felt in the country to establish a National Knowledge Network (NKN) inter-connecting all knowledge and research institutions in the country through a high bandwidth network. Globally, research & development activities and innovations are increasingly becoming multidisciplinary and collaborative, and require substantial communication/computational power.

Organizational structure:



Role of NKN

- • Establishing a high-speed backbone connectivity which will enable knowledge and information sharing amongst NKN connected institutes
  •Enabling collaborative research, development and innovation amongst NKN connected institutes
  •Facilitating advanced distance education in specialized fields like engineering, science, medicine etc.
  •Facilitating an ultra-high speed e-governance backbone
  • Facilitating connection between different sectoral networks in the field of research
- NKN is designed to provide high availability, Quality of Service, security and reliability. The purpose of NKN goes to the very core of the country's quest for building quality institutions with requisite research facilities and to create a pool of highly trained professionals.
- NKN has been established keeping the following features in mind:
- Establishing a high-speed backbone connectivity which will enable knowledge and information sharing
- Enabling collaborative research, development and Innovation
- Facilitating advanced distance education in specialized fields such as engineering, science, medicine etc.
- Facilitating an ultra-high speed backbone for e-Governance
- Facilitating integration of different sectoral networks in the field of research, education, health, commerce and governance.
- Link to Global Networks to collaborate with the research communities across the globe.

Based on the design objective, geographical spread and the expected usage, the following technical features are envisaged for NKN:

- NKN is a protocol independent network and is designed to carry multiprotocol traffic.
- NKN is capable of offering hierarchical Quality of Service (QoS) for real time traffic (voice and video) and guaranteed bandwidth for business critical applications. NKN governance backs it up by Service Level Agreements (SLAs) for the users.
- NKN design supports IPv6 transport, IPv6 networking and IPv6 MPLS VPN services in addition to the similar facilities based on traditional IPv4.
- NKN design, implementation, management, and control is such that service provisioning is internal to the NKN network and does not depend on telecom service providers from whom “raw” bandwidth or fiber is likely to be leased.
- NKN design supports Multicast enabled VPN for running Multicast applications, both in IPv4 and IPv6.
- NKN management is capable of handling provisioning for the central services such as Multimedia Conferencing, e-access, digital library, and central data centre to all users.
- NKN will provide access to secure data centre with Information Assurance.

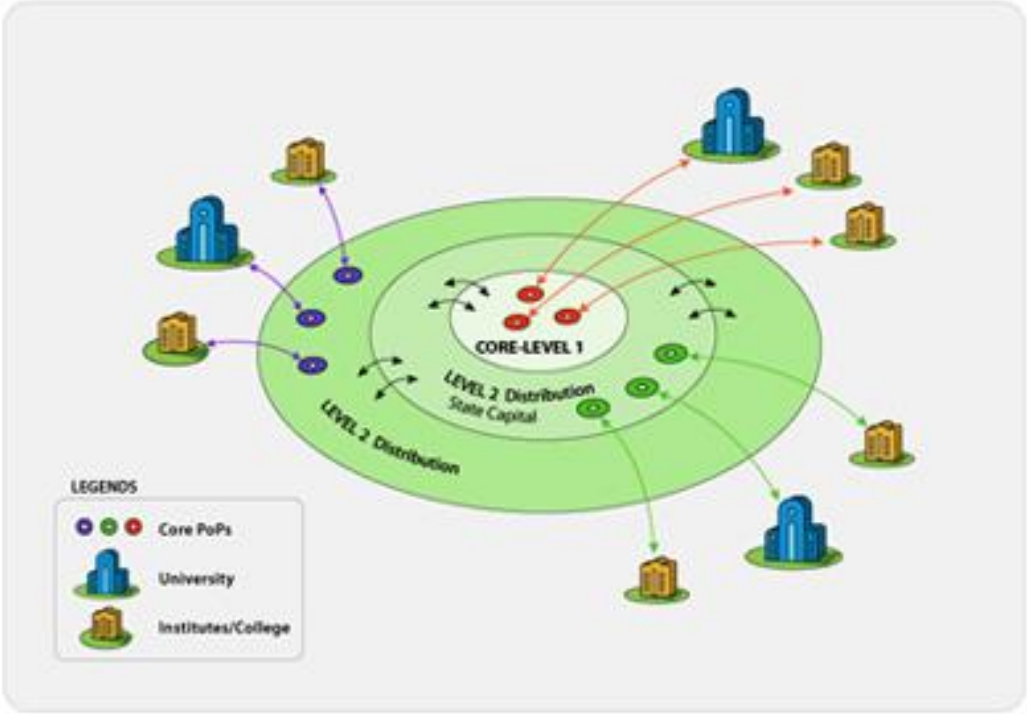
Detailed Design

NKN is a hierarchical network divided into three basic layers –

Core (Level 1),

Distribution (Level 2),

Edge (User Level).



Depending on the type of connectivity required by the user organization, geographical presence, and the location of Points of Presence (PoP) of NKN, (belonging to Core and Distribution), connectivity would be provided to the institutes. NKN backbone will typically have 18 Core PoPs and around 25 Distribution PoPs across the country.