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Guidance to establish AMDCN: the example of the RMDCN in RA VI
(Submitted by ECMWF)

Summary and purpose of document

In the near future, GISCs will have to build an AMDCN in their area of responsibility. The RMDCN is operational for more than 10 years. The document describes the situation on the RMDCN and the relationship between the provider of the network, the connected countries and ECMWF.

ACTION PROPOSED:

The meeting is invited to review the document and then to prepare a guidance material for the creation of AMDCNs.

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1. A bit of history

In January 1993 a WMO RA VI working group on Planning and Implementation of the WWW in Region VI identified the necessity to reorganize the GTS in the Region. Following this, a Subgroup on Regional aspects for the GTS made a first proposal for a global modernisation of the Regional Main Telecommunications Network (RMTN) to be known as the “Regional Meteorological Data Communication Network”. During the 11th session of the RA VI General Assembly meeting in Oslo in May 1994 the RMDCN Steering Group was established. During the years that followed the Steering Group investigated the requirements for the GTS in the Region at the time and issued a Request for Information and a Request for Quotation to various potential suppliers (IBM, SCITOR and Global One). The Steering Group recommended the establishment of a partnership with ECMWF for the RMDCN project for the following reasons:

- ECMWF constituted the “critical mass” of partnerships required for the successful implementation of the RMDCN. An important factor was that ECMWF could sign a contract on behalf of its Member States which was seen as a key advantage;
- RMDCN and ECMWF requirements for a transport network were largely the same;
- ECMWF had a set of agreed rules and procedures which could be applied to the RMDCN project.

Tip N.1: A “critical mass” of sites to be connected on Day 1 is needed for the network to be viable.

During 1995 ECMWF was asked to participate in the RMDCN Steering Group. The work of the Steering Group resulted in a request made to ECMWF Council at its 44th session (July 1996) by France to consider a proposal for a Joint Telecommunications Network between ECMWF and the GTS in WMO RA VI. Following this request the ECMWF Technical Advisory Committee at its 23rd session (October 1996) established a Subgroup to follow the development of such a network. The 2nd meeting of the RMDCN Steering Group in September 1996 recommended that:

- ECMWF should be requested to undertake the procurement, implementation and operation of the network for all countries;
- An RA VI Contract Advisory Committee (CAC) for the procurement and implementation phase and later development of the RMDCN should be established to advise ECMWF and that after the implementation phase an RMDCN Operation Committee (ROC) should be established;
- An agreement should be concluded between WMO RA VI and ECMWF.

Following the relevant Resolution approved during the 12th session of the RA VI General Assembly (May 1998) and the subsequent decision by ECMWF’s Council at its 48th session, the agreement between ECMWF and WMO for the provision of the joint ECMWF/GTS-RA VI network entered into force in July 1998 with an exchange of letters between the Director of ECMWF and the WMO Secretary-General. The key elements of this agreement are as follows:

- (i) ECMWF will provide a meteorological data communications network service to its Member States to carry GTS and related traffic and be willing to provide for the extension of this service to all RA VI members which are not Member States of ECMWF. The service provider will be committed to extend the service to all RA VI Members;

(ii) WMO and ECMWF recognize that the RMDCN will be part of the Global Telecommunication System (GTS) of the WMO World Weather Watch regarding the RA VI telecommunication requirements. The GTS services of the RMDCN will be coordinated through the relevant WMO bodies and according to WMO policies and procedures. ECMWF, in close liaison with the WMO Secretariat and RA VI Members participating in the RMDCN, shall carry out the procurement and monitoring of the RMDCN;

(iii) ECMWF commits itself to monitor the RMDCN on behalf of all participating Members, including the monitoring of the Service Level Agreement and the quality of service delivered;

(iv) the underlying transport layer will not change for at least 5 years;

(v) each participating Member agrees to use the RMDCN only for the GTS and related traffic.

Tip N.2: An agreement between WMO and the entity managing the network is required

Following approval by ECMWF's Council at its 47th session (December 1997), an Invitation to Tender (ITT) for the provision of the RMDCN was issued on 6 March 1998. After the evaluation and presentation of the results, ECMWF's Council at its 49th session (December 1998) approved the selection of EQUANT Network Services Ltd to provide the RMDCN network. This supplier offered the best value for money given the current and future requirements of ECMWF and its Member States and Co-operating States. Similarly, it also provided the best coverage for the whole of the WMO RA VI.

The contract with the provider EQUANT UK Ltd¹ was signed in December 1998. The implementation took approximately 15 months and in March 2000 the network was accepted and the operational phase of the RMDCN project started, 7 years after it was established. The first network was based on Frame Relay architecture with the Frame Relay Permanent Virtual Circuits replacing the old GTS Leased Line circuits.

The major elements of the Service Level Agreement were:

- 24 * 7 operational service;
- 99.5% availability for site with a backup;
- 4 hour repair time;

Since the start of the operational phase ECMWF has been monitoring the network and the Service Level Agreement. It has kept the RMDCN community informed of the performance of the RMDCN through the RMDCN Operations Committee which has met at least once a year since the start of the operational phase.

Tip N.3: A committee representing all parties involved to address operational aspects of the network is needed.

Since the start of the operational phase of the RMDCN in March 2000, there have been 4 Supplements to the original Contract for the RMDCN.

¹ The original service provider was EQUANT Network Services Ltd which has now become Orange Business Services (OBS) following the merger of EQUANT with France Telecom and Orange.

The most recent one, Supplement 4, dated 8 May 2006, implemented the transition to an infrastructure based on MPLS IPVPN technology. It was a major change to the contract as the whole Service Level Agreement had to be adapted to the new type of service. The major changes to the Service Level Agreement were:

- 100% availability for Mission Critical sites;
- 99.9% availability for sites with ISDN backup;
- 2 hour repair time;

Tip N.4: Being an time-critical operational service, the Service Level Agreement should be as high as possible and consistent with the technology used.

Tip N.5: On such a network the price of the connection is strongly related to the speed of the access. However, including various types of backup options is a way to have a more cost effective solution.

2. The network technologies

After the leased lines based networks, the market evolved to service oriented solutions. In the 1990s and in the early 2000s, the dominating technology was Frame Relay. The first generation of the RMDCN was based on Frame Relay. With the emergence of ATM based networks, and other technologies to build very high speed IP based networks, MPLS has now become the de-facto standard for WAN enterprise grade networks. In February 2010, a workshop organised at ECMWF considered the potential terrestrial based technologies for the future of the RMDCN. Even if layer 2 type of technologies seem very cost-effective solutions, it appears that for the foreseeable future for the range of speeds of interest for AMDCNs (between hundreds of kbit/s to multiple hundreds of Mbit/s), the underlying technology for the network will be MPLS.

MPLS technology is a very attractive solution as it offers a very large choice of access technologies (Leased Lines, Ethernet...), wide-range of access speeds (from 64kb/s to 500Mb/s), allows any-to-any connectivity, offers multiple Class of Service...

Tip N.6: The forthcoming AMDCN operational and managed networks are likely to be MPLS clouds.

3. The contract, Accession Agreement and billing

As explained above, the RMDCN contract has been signed between OBS UK and ECMWF. Considering the relationship between ECMWF and its Member States, the connection for these sites is managed and partly funded by ECMWF. However, for countries without any agreement in place with ECMWF, they will have to sign an Accession Agreement with the network provider. An example of such an Accession Agreement is available in the Annex.

Tip N.7: A mechanism such as the Accession Agreement simplifies the connection of countries. This provides the legal binding between the connected site and the provider and is using the master contract as the reference.

In a leased line based environment or in a frame relay situation, it is possible for each party connected to deal with a local telecommunications provider and to rely on the interconnection of services to provide the end-to-end connectivity. In an MPLS environment, even if, in theory, the interconnection of various providers is possible this has some significant drawbacks. For example, it is very likely that in such a set up, it will not be possible to have an end-to-end Quality Of Service. Building an AMDCN will very probably rely on one single provider and one single contract.

This has been always the case for the RMDCN.

However, we saw that in some cases even for global provider such as OBS, the current model with one contract with the United-Kingdom entity of OBS could create problems such as:

- OBS does not have the licence to provide the service to a Meteorological Service in some countries. An OBS subsidiary in the country or a local reseller has such a licence.
- The local site is not allowed (due to national telecom regulations) to sign a contract (or an accession agreement) with a foreign company.
- Payment of monthly invoices in foreign currency can be very difficult for National Meteorological Services.
- The telecommunication market in a country is still under very strict regulation and only the local carrier(s) are allowed to provide a telecommunication service.

Tip N.8: The GISC in charge of the establishment of the AMDCN should very carefully assess the regulation of the telecommunication market in the various countries to make sure that the contractual arrangement allows most (if not all) potential sites to join the network. This could for example include the possibility to deal locally with a 3rd party provider, paying in local currencies, etc.

4. Daily management of the network

In most of the cases, in MPLS type of networks, the network providers are used to deal with one main site (e.g. headquarters) and multiple branch sites. The HQ site is usually the primary contact and is in charge of all financial and operational aspects of the network. In the WMO environment, this is not the case. We saw previously that for the financial aspects a one-to-one relationship will be needed between the connected countries and the network provider. This could be achieved through the Accession Agreement approach.

For the daily management of the network, the lack of central management entity could be a problem.

It would be extremely difficult for the network provider to deal individually with all connected sites for the daily operation of the network. For example, The Service Level Agreement is a very important part of the operation on the network. The provider must have a single point of contact to deal with the SLA and the connected sites have to be sure that a consistent approach is followed.

Tip N.9: The network provider must have a single point of contact that is then in charge to liaise with the connected sites if and when needed.

On the RMDCN, this operational management role of the network is ECMWF's responsibility. This is also part of the agreement between ECMWF and WMO. Figure 1. shows, following the ITIL standard, the Service Operation role of ECMWF.

It is ECMWF's responsibility towards its Member States to fund and to manage the operational network required to disseminate its products to the countries. The cost of the management of the RMDCN is paid out of ECMWF budget.

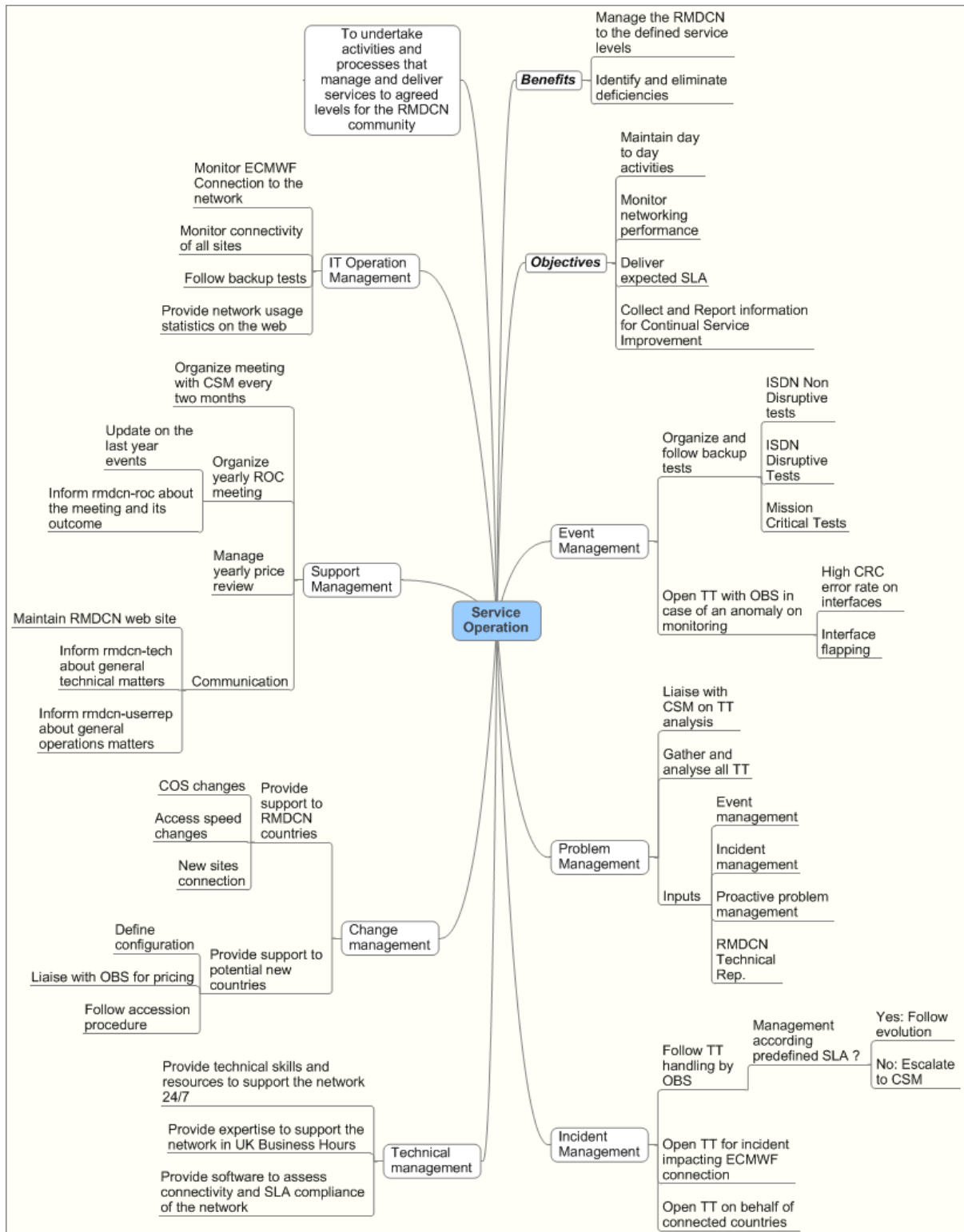


Figure 1: An ITIL view of the RMDCN Service Operation

The Wide-Area Network Team at ECMWF in charge of the management of the RMDCN is entirely funded out of ECMWF budget. It means that the management of the network is provided free of charge for the countries connected.

However, such a solution may not be possible in the case of other AMDCN.

Tip N.10: The management of the AMDCN will not be cost neutral for the GISC. The GISC may decide to manage the network in-house or may decide to subcontract the management of the network. In any case, this will add cost on top of the cost of the connections.

5. Conclusion

This document describes how the RMDCN is managed and what the role of ECMWF is in this context. The working group is invited to discuss if this model is applicable to other AMDCN and, based on the discussion, prepare the relevant guidance for the GSICs.