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COMMISSION FOR BASIC SYSTEMS

ITEM 6.2

OPAG ON INFORMATION SYSTEMS & SERVICES

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Expert Team on Communication Techniques and Structure

Geneva, 30 Apr – 03 May 2012

Past, present and future of the RMDCN
(Submitted by ECMWF)

Summary and purpose of document

The RMDCN has been established more than 10 years ago. This document summarizes the last decade on the network, describes the current situation and introduces the plan to procure a new RMDCN.

ACTION PROPOSED:

For information.

Table of content

1. Background on the RMDCN

1.1. How the RMDCN was established

In January 1993 a WMO RA VI Working Group on Planning and Implementation of the WWW in Region VI identified the necessity of reorganizing 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" (RMDCN). 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.

During 1995 ECMWF was asked to participate in the RMDCN Steering Group. The work of the steering group resulted in a request made to 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 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 ECWMF 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.

1.2. The first Technical Advisory Committee Subgroup on the RMDCN

The ECMWF Technical Advisory Committee Subgroup on the RMDCN reported to the ECMWF Technical Advisory Committee at its 24th session (July 1997) that a managed network could provide ECMWF Member States with a technically sound and financially favourable solution for the provision of a telecommunications service for both ECMWF and GTS-related traffic. The ECMWF Technical Advisory Committee Subgroup on the RMDCN continued to work on the project. In co-operation with the WMO RMDCN CAC, the subgroup assisted in the preparation and review of the various procurement documents (specification of requirements and the draft contract). It also prepared the draft documents for the agreement between WMO and ECMWF.

1.3. The first invitation to tender in 1998

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 to the ECMWF Technical Advisory Committee and Council, the ECMWF 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 then current and future requirements of ECMWF and its Member States and Co-operating States. It also provided the best coverage for the whole of the WMO RA VI.

1.4. The WMO - ECMWF agreement

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. A copy of this exchange of letters is attached as Annex 1. The key elements of this agreement are as follows:

a) 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.

b) 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 co-ordinated 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, will carry out the procurement and monitoring of the RMDCN.

c) ECMWF commits to monitor the RMDCN on behalf of all participating Members, including the monitoring of the service level agreement and the quality of service delivered.

d) The underlying transport layer will not change for at least five years.

e) Each participating member agrees to use the RMDCN only for the GTS and related traffic.

1.5. From implementation to operational network

The contract with the provider EQUANT UK Ltd 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 a frame relay architecture, with frame relay permanent virtual circuits (PVCs) 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

ECMWF has been monitoring the network and the service level agreement since the start of the operational phase. 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.

2. Evolution of the RMDCN since 1998

2.1. Contractual changes

Since the start of the operational phase of the RMDCN in March 2000, there have been four supplements to the original contract for the RMDCN.

- Supplement 1, dated 23 December 1999, dealt with some minor changes to the service particulars and list of countries.
- Supplement 2, dated 27 June 2002, incorporated the extension of the service beyond the members of WMO RA VI to other relevant national meteorological and hydrological services or organisations involved in the exchange of meteorological or related information as part of WMO or other international programmes willing to sign an accession agreement. The background to this was, at WMO's request, to implement RMDCN connections designed to improve the GTS Main Telecommunications Network (MTN), taking into account the proposals made by the Expert Team on the Improved Main Telecommunications Network (IMTN). This was approved by Council at its 55th session (December 2001). At that time, an important aspect of the Technical Advisory Committee recommendation to the Council was the issue related to manpower requirements:

  > *"Additional RMDCN members will inevitably lead to an increased workload for the RMDCN project team at ECMWF. If the third RMDCN staff member, foreseen from the beginning of the project, is authorised by Council in December 2001, the project team will be able to cope with a limited increase in RMDCN members. The addition of a modest number of connections between existing RMDCN members and WMO members outside RA VI, including the links that would be required for the IMTN project, can be supported without further staffing requirements. However, any substantial increase in RMDCN members would lead to additional manpower requirements."*

- Supplement 3, dated 17 December 2002, related to the implementation of a major upgrade of the frame relay network infrastructure. The price review in April 2002 provided sufficient scope for increasing the various frame relay PVCs and access circuits without an increase in the overall charges. An important consequence of this upgrade was that the line speed of the 'basic package' for a ECMWF Member State connection to the RMDCN (funded out of the ECMWF budget) was increased by a factor of three (from 128 kbps to 384 kbps).
- Supplement 4, dated 8 May 2006, covered 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

  As part of this migration the ECMWF 'basic package' for the connection to the RMDCN was increased to 768 kbps and the ISDN backup to 384 kbps.
- Supplement 5, dated 27 June 2011, covered the issue of flexible termination in anticipation of a procurement and migration. It allows for site-by-site termination with 90 days' notice. To safeguard against unexpected delays in the ITT process, if for any reason no site has been terminated by 31 March 2014, then from 1 April 2014 the clause regarding the price review mechanism defined in Supplement No. 3 (annual price reviews and biennial contract review) would come into force again. To avoid the risk of losing the RMDCN, in the event of a major delay, OBS has the obligation to provide the RMDCN service until 31 March 2016, with ECMWF having the right to terminate the agreement at any time with six months' notice. In addition the ECMWF funded 'basic package' for ECMWF Member States was upgraded to 2 Mbps IP Bandwidth.

2.2. Architectural changes

The first generation of the RMDCN, implemented in 2000, was based on a frame relay architecture, PVCs replacing the leased lines that had previously been used for the GTS. This architecture proved to be very

reliable and one of its key advantages was the end-to-end performance guarantee per PVC. The performance of the service provider was very good. One of the problem areas for the frame relay architecture was that the maintenance and management of changes was very complicated and often led to problems, when change requests were not implemented correctly, due to their complexity. ECMWF regularly checked the status of new network architectures that could potentially replace this frame relay architecture without compromising the operational requirements. In 2002 and 2004 offers for a network based on multi-protocol label switching (MPLS) were investigated. While the MPLS offer in 2002 was regarded as not yet sufficiently mature and price-competitive, in 2004 EQUANT made an offer to migrate to an MPLS IPVPN architecture which was both architecturally and financially very interesting. The major elements of the proposal were:

- Migration to MPLS IPVPN architecture resulting in any-to-any connectivity and 'class of service' concept
- Extension of the contract term by 12 months to March 2009 and thereafter on a rolling basis for successive terms of 12 months

The ECMWF Technical Advisory Committee at its 34th session (October 2004) and the WMO RMDCN Steering Committee (in July 2004) were both in favour of this migration and ECMWF Council approved it at its 61st session (December 2004). Following lengthy contract negotiations, Supplement 4 of the RMDCN contract was signed on 8 April 2006. The implementation strategy was to build a completely separate network in order to minimize the risk of impacting on the operational activities of the frame relay network. This process took approximately 13 months and on 18 June 2007 the migration to the MPLS IPVPN was completed.

3. Considerations for the provision of the RMDCN service beyond 2010

During 2008, the ECMWF Technical Advisory Committee considered the provision of the RMDCN service beyond 2010. As part of this process a meeting of the WMO RA VI RMDCN Steering Group was held on 4-6 June 2008 in Vienna to discuss the future service provision for the RMDCN.

In October 2008, the ECMWF Technical Advisory Committee:

a) agreed that an invitation to tender for the RMDCN be postponed for three to four years, considering that an independent market survey did not indicate the potential for significant cost savings and that by then, the requirements for the next generation of the RMDCN should be more clearly understood, especially in relation to the WMO Information System;

b) agreed that the current contract with OBS represents good value for money and the current practice of regular price reviews be pursued, to ensure that the OBS contract continues to deliver good value for money;

c) agreed that OBS continue to provide the RMDCN service for the next 3-4 years, under the existing contract framework;

d) supported the Internet as a viable access method to the MPLS cloud, provided that the disadvantages of such a solution (including risks relating to reliability, lack of guaranteed service levels, etc.) are clearly understood and accepted by the sites wishing to use this method;

e) agreed that the Internet is a backup method suitable for inclusion in the range of backup options available for RMDCN sites and that a large-scale operational pilot implementation be undertaken[1], based on the following guidelines:

- the communication is secured using IPSEC VPN;
- a network backup solution is used as the preferred option, although application backup may be used, when agreed between the parties involved;
- only one type of hardware, as approved by the RMDCN Operations Committee, is used by all sites participating in the IPSEC VPN backup network;
- the IPSEC VPN devices are managed by the local sites themselves;
- a framework of processes to manage the IPSEC VPN network is established and all sites participating in the IPSEC VPN backup network commit to adhere to the agreed procedures;

f) agreed that the very reliable and highly available service provided by the RMDCN is vital to ECMWF, its Member States and Co-operating States and all WMO connected countries and requires regular upgrading, in order to meet the increasing demands of product dissemination and data exchanges

Following the recommendations of the Technical Advisory Committee; the ECMWF Council, at its 70th session (December 2008), agreed that the following categories of countries will be considered as potential future members of the RMDCN:

- ECMWF Member States and Co-operating States
- RA VI countries not currently connected to the RMDCN
- Countries operating MTN centres in the framework of the IMTN (Improved Main Telecommunications Network), including future GISCs
- Countries outside RA VI connected to a RA VI country as part of the GTS, upon request by the RA VI country concerned

Connections outside these four groups are not foreseen by the WMO ICG-WIS recommendation for the WIS communication infrastructure and are thus not to be encouraged.

4. The situation on the current network

4.1. The RMDCN geographical coverage

The RMDCN currently provides connections to 49 sites. They are:

- 45 national meteorological services
- ECMWF
- EUMETSAT (2 sites)
- 1 disaster recovery site for The Netherlands

Figure 1 below shows the geographical coverage of the RMDCN, as of February 2012.

[1] This was then implemented as an “Operational DMVPN pilot”, see 4.3. After the migration to the new network, the DMVPN pilot project will be evaluated and it will then be decided to continue or to terminate that service.

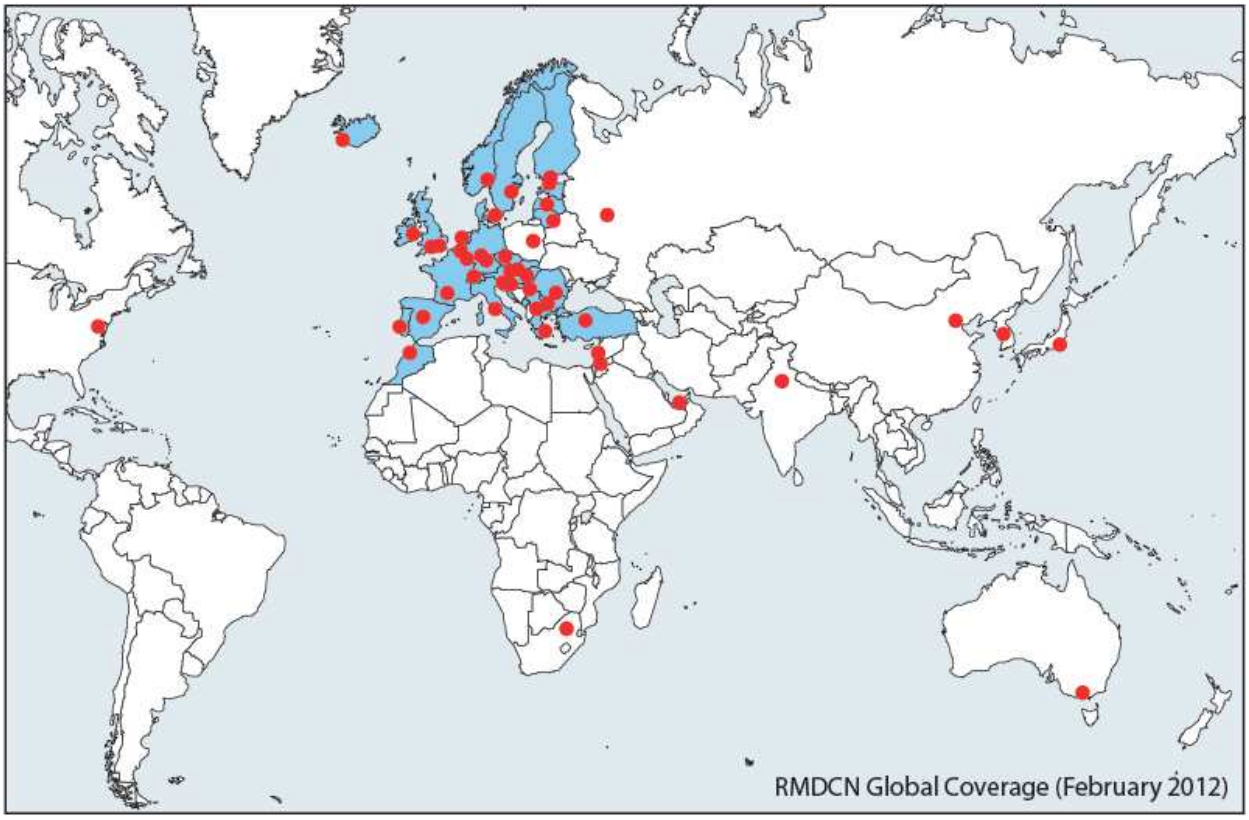

Figure 1: Geographical coverage of the RMDCN

Israel was connected in June 2011 with a "mission critical" connection at 1 Mbps IP bandwidth. South Africa signed the accession agreement to the RMDCN in August 2011. Its mission critical connection, with 2 Mbps IP bandwidth, was installed in February 2012.

After its suspension of the network in 2009, Saudi Arabia decided to terminate its connection. This was done in July 2011.

As explained in 1.4, the MoU signed between WMO and ECMWF, one of the key elements is:

> *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*

However, after more than ten years, the network does not cover the entirety of RA VI. The map below (Figure 2) shows the countries not connected.

It was agreed at the WMO Task Team meeting to check with the RA-VI countries not yet connected to the RMDCN on their intention to be connected in 3 to 5 years. It must be noted, in particular, that the countries in the eastern part of the region would likely be part of an AMDCN that GISC-Moscow may decide to establish as part of their responsibilities as a GISC.

Figure 2: Map of RA VI countries not connected to the RMDCN

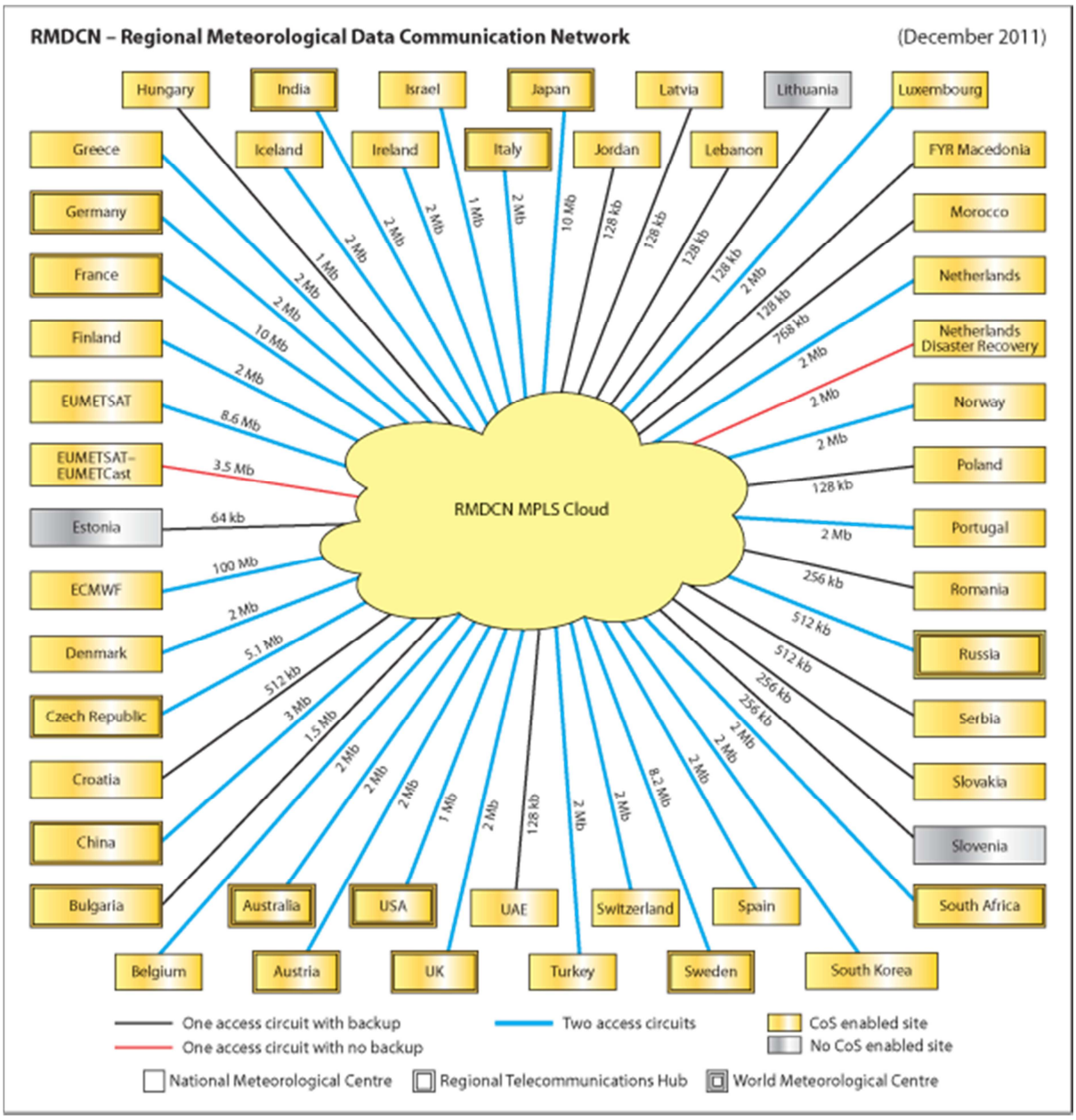

Figure 3: RMDCN configuration

Figure 3 shows the latest RMDCN configuration (as of December 2011).

Country/Site	Access Speed	Port Speed	Resiliency	CoS	Backup Speed	Proactive/Reactive
ECMWF Member States						
Austria	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Belgium	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Denmark	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Finland	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
France	**10M**	**10M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Germany	**10M**	**8M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Greece	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Iceland	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Ireland	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Italy	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Luxembourg	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Netherlands	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Netherlands-DR *	2M	2M	N/A *	Gold	N/A	Proactive
Norway	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Portugal	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Spain	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Sweden	**8/10M**	**8.2/6.1M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Switzerland	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Turkey	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Reactive**
United Kingdom	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
ECMWF (LB **)	**100M**	**100M**	**mission critical**	**Gold**	**N/A**	**Proactive**
ECMWF Co-operating States						
Bulgaria	2M	1.5M	enhanced	Gold	128k	Reactive
Croatia	512k	512k	enhanced	Gold	256k	Proactive
Czech Republic	**6M**	**5.1M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Estonia	64k	64k	enhanced	**Silver**	64k	Proactive
EUMETSAT	**10M**	**8.6M**	**mission critical**	**Gold**	**N/A**	**Proactive**
EUMETSAT- EUMETCast *	4M	3.5M	N/A *	Gold	N/A	Proactive
Hungary	1M	1M	enhanced	Gold	256k	Proactive
Israel	**2M**	**1M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Latvia	128k	128k	enhanced	Gold	128k	Proactive
Lithuania	128k	128k	enhanced	**Silver**	128k	Proactive
Macedonia (FYR of)	128k	128k	enhanced	Gold	128k	Proactive
Morocco	1M	768k	enhanced	Gold	128k	Proactive
Romania	2M	256k	enhanced	Gold	128k	Proactive
Serbia	512k	512k	enhanced	Gold	256k	Reactive
Slovakia	256k	256k	enhanced	**Silver**	128k	Reactive
Slovenia	256k	256k	enhanced	Gold	256k	Reactive
Other RMDCN Member States						
Australia	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
China	**4M**	**3.4M**	**mission critical**	**Gold**	**N/A**	**Reactive**
India	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
Japan (LB **)	**10M**	**10M**	**mission critical**	**Gold**	**N/A**	**Reactive**
Jordan	128k	128k	enhanced	Gold	128k	Proactive
Lebanon	128k	128k	enhanced	Gold	128k	Proactive
Poland	128k	128k	enhanced	Gold	128k	Reactive
Russian Federation	**512k**	**512k**	**mission critical**	**Gold**	**N/A**	**Reactive**
South Africa	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
South Korea	**2M**	**2M**	**mission critical**	**Gold**	**N/A**	**Proactive**
United Arab Emirates	128k	128k	enhanced	**Gold**	64k	Reactive
United States of America	**1.5**	**1M**	**mission critical**	**Gold**	**N/A**	**Proactive**
* No backup mechanism.						
** Load Balancing active						**14/03/2012**

4.2. Network reliability

As can be seen in Figure 4, the performance of the RMDCN over the last 12 months has been very good. The reliability of the network is high, having achieved 100% availability over most of the reporting period. The availability figures (Figure 4) show the percentage of availability of a full operational service (without any incidents) (orange) and the percentage during which there were incidents that did not cause unavailability, since the backup was successfully activated (blue).

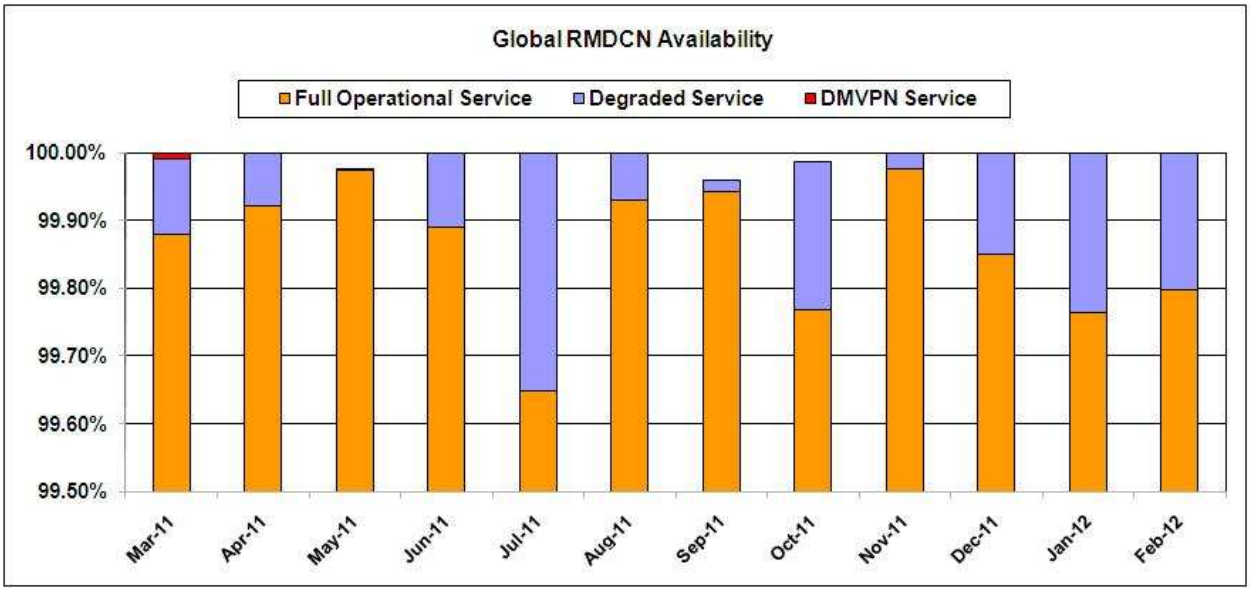

Figure 4: RMDCN availability

4.3. Operational DMVPN pilot

The large-scale operational DMVPN pilot project has been operational since October 2010. Currently seven countries are connected:

- ECMWF (primary hub-site)
- Sweden (backup hub-site)
- Bulgaria (since 2 November 2010)
- Italy (since 25 November 2010)
- Norway (since 8 December 2010)
- Romania (since 16 March 2011)
- Germany (since 9 December 2011)

All the DMVPN installations were deployed in co-operation with the local sites and OBS was directly involved, as some minor changes are required on the RMDCN routers at the local site.

Since the start of the operational phase of the pilot there have been no incidents on the DMVPN that had an operational impact. The events in Italy showed that the DMVPN can provide a reliable and dynamic backup solution for the RMDCN.

5. The RMDCN Next generation

5.1. Procurement process plan

Following the recommendation of the ECMWF Technical Advisory Committee in 2008 to delay an invitation to tender for the RMDCN for three to four years and given the fact that a procurement process

would take at least 24 months, ECMWF presented a plan to the ECMWF Technical Advisory Committee in October 2010 to initiate a procurement process for a new RMDCN. Figure 1 shows an overview of the timeline for this plan.

Figure 5: Timeline of an overview of the procurement process

Three phases were identified. The first phase was the definition of requirements, which involved discussions between ECMWF and its Member States and Co-operating States about their requirements, as well as meetings with the WMO Task Team regarding the WIS/GTS requirements. The requirements were reviewed by the ECMWF committees (Technical Advisory Committee and Finance Committee) in October 2011; they approved the outcome and the plan presented. Finally, in December 2011, ECMWF Council gave approval for the launch of an ITT in early 2012.

The second phase is the procurement itself, which is now underway. This phase is divided into three sections and is expected to be completed by the end of 2012:

a) Writing of the specification of requirements and issue of the ITT (published on 15 February 2012)

b) Evaluation of tenders

c) Contract negotiation

The ECMWF Council would then be able to authorize the conclusion of a contract with the chosen supplier at its session in December 2012.

The third and final phase is the actual migration to the new network and this would be scheduled to take place during the major part of 2013 with a possibility to extend to early 2014.

5.2. The organisation of the project

In order to facilitate the definition of the requirements, the project was split into 6 work packages:

Work package 1: Technical requirements

Develops the technical solution to be deployed, including primary and secondary bandwidths, access technologies, backbone technologies, CE routers, optimisation technologies and devices as well as class and quality of service.

Work package 2: Service level agreement

Includes the complete range of SLAs that the new RMDCN will require, their definition, measurement and penalties, e.g. technical SLAs such as availability, packet loss, time to repair, latency and jitter; commercial SLAs such as change request processing, deployment delays and billing accuracy, as well as performance bonds, critical failure SLAs and credit escalation mechanisms.

Work package 3: Project management and solution implementation

Includes all elements of how the new RMDCN will be deployed e.g. timetable, project process, project management methodology, project management personnel, risk management processes and reporting processes.

Work package 4: Account and service management

Includes all aspects of the account and service interface between ECMWF, RMDCN sites and the service provider e.g. account and service personnel, locations, key personnel protection clauses, types and frequency of interface and reporting, overall relationship governance and senior management interface.

Work package 5: Commercial solution

Includes the complete range of commercial elements the new RMDCN will require, e.g. contract term, billing, payment terms, termination rights, flexibility, growth and shrinkage provisions, benchmarking and technology refresh.

Work package 6: Development of contract terms and conditions

Includes all terms to cover the commercial, technical and operational areas of a contract for the new RMDCN.

The definition of requirements was completed with the contribution of ECMWF, the Member States and Co-operating States, as well as experts from the WMO Task Team.

The ITT for the provision of the RMDCN service was issued on 15 February 2012 and the deadline for receipt of tenders is 23 April 2012. The following 4-5 months will be used for evaluating the responses to the ITT. Then, subject to ECMWF Council's approval, contract signature is envisaged in December 2012.

During the first half of 2013 all RMDCN sites will be asked to define their exact configuration for the new network. Most sites are expected to migrate to the new network during the second half of 2013. It is hoped that the migration can be completed late 2013 or early 2014. In any case, it is expected that by mid-2014 at the latest all sites will have migrated to the new network.

Figure 6 shows a detailed timeline of the project plan for the procurement process for a new RMDCN.

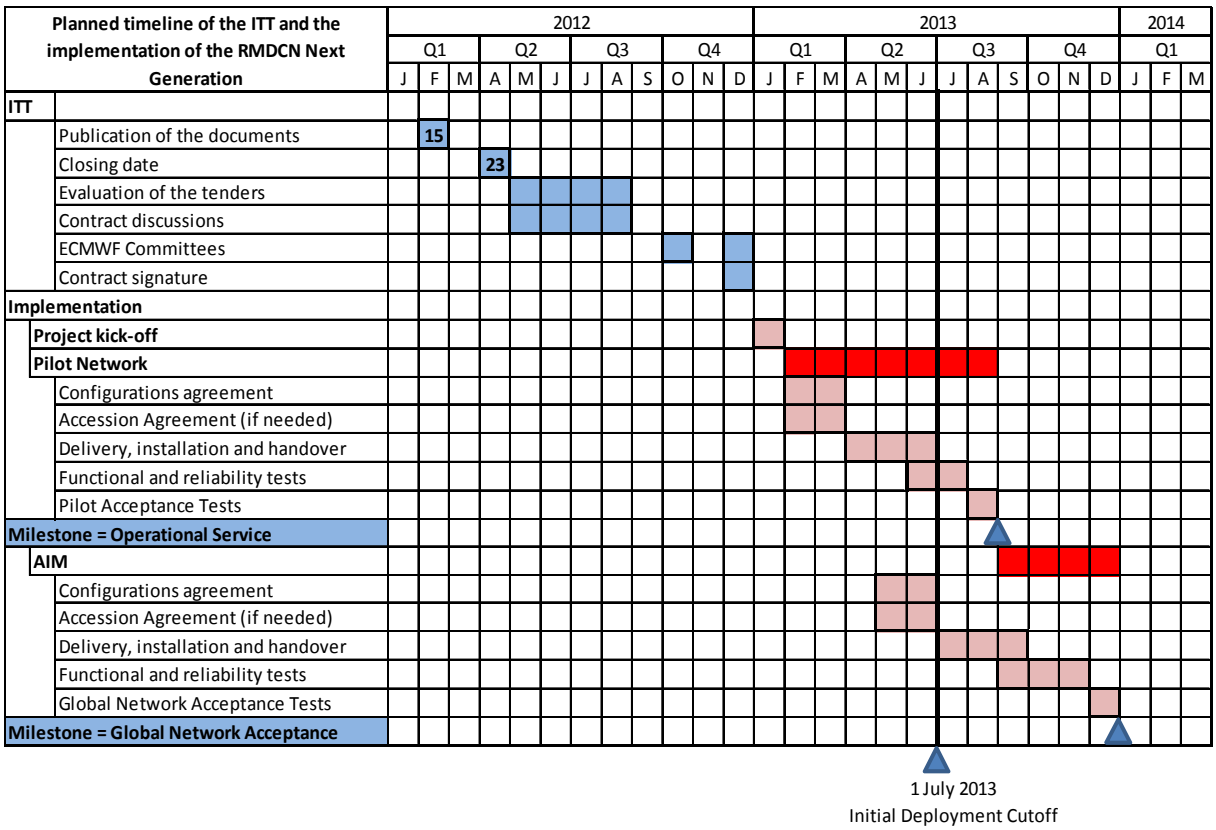

Figure 6: RMDCN ITT Project timeline

5.3. Technical requirements and potential SLA

Based on technical and financial considerations, five potential types of configuration have been identified and detailed in the following sections. They have been named: platinum, gold, silver, bronze and copper.

This classification represents a generic model of service types for sites, which are differentiated by service elements such as type of access line, backup connection, service level agreement etc. It has been used as a framework for the specification of requirements for the procurement of the future RMDCN service.

Each site type will have its own Service Level Agreements.

Note that the figures below regarding the SLA values are indicative only and may not reflect the actual values resulting from the procurement. In their responses to the ITT, the potential network providers will be invited to confirm which type of site they will support and what would be the associated SLA figures.

Platinum site

Platinum sites are defined as having the following specification:

- Identical primary and back-up Ethernet or leased line access circuits
- Identical bandwidth across both access circuits
- Circuits can be configured in active/active traffic flow mode
- Access circuits are delivered via dual PoPs (Point of Presence), dual exchanges to dual CPE (Customer Premises Equipment) with the guarantee of circuit separacy from CPEs to PEs (Provider Equipment)

Platinum sites have a per-site availability and rebates for failing to reach the agreed service levels:

- Availability - 100%; GTTF (guaranteed time to fix) – 2 hours
- Service Rebate of 50% of site MRC (monthly recurring cost) for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis

Platinum sites have a per-circuit availability and rebates for failing to reach the agreed service levels:

- Availability – 99.90; GTTF – 6 hours
- Service Rebate of 2% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis.

Gold site

Gold sites are defined as having the following specification:

- Identical primary and back-up Ethernet or leased line access circuits
- Identical bandwidth across both access circuits
- Circuits can be configured in active/active or active/passive traffic flow mode
- Access circuits are delivered via dual PoPs and dual exchanges where possible. Circuits are connected to dual CPEs

Gold sites have a per-site availability and rebates for failing to reach the agreed service levels:

- Availability – 99.97%; GTTF – 4 hours
- Service Rebate of 20% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis

Gold sites have a per-circuit availability and rebates for failing to reach the agreed service levels:

- Availability – 99.90%, GTTF – 6 hours
- Service Rebate of 2% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis.

Silver site

Silver sites are defined as having the following specification:

- Primary and back-up Ethernet or leased line access circuits
- Lower speed bandwidth on back-up access circuits, compared to the primary
- Circuits are configured in active/passive traffic flow mode
- Access circuits are delivered via dual PoPs and dual exchanges where possible
- Circuits are connected to dual CPEs

Silver sites have a per-site availability and rebates for failing to reach the agreed service levels:

- Availability – 99.95%; GTTF – 6 hours
- Service Rebate of 10% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis

Silver sites have a per-circuit availability and rebates for failing to reach the agreed service levels:

- Availability – 99.90%; GTTF – 6 hours

- Rebate of 2% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis.

Bronze Site

Bronze sites are defined as having the following specification:

- Primary Ethernet or leased line access circuit
- Low-grade back-up access circuit using xDSL, wireless, or Internet VPN
- Circuits are configured in active/passive traffic flow mode
- Access circuits are delivered via dual PoPs and dual exchanges where possible. Circuits are connected to dual CPEs

Bronze sites have a per-site availability and rebates for failing to reach the agreed service levels:

- Availability – 99.90%, GTTF – 8 hours
- Service Rebate of 7% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis

Bronze sites have a per-circuit availability and rebates for failing to reach the agreed service levels:

- Ethernet or leased line: Availability – 99.90%, GTTF – 6 hours
- Service Rebate of 2% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis
- xDSL, wireless, Internet VPN: Availability – 99.50%, GTTF – 24 hours
- Service Rebate of 0.5% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis.

Copper site

Copper sites have the following specification:

- Primary Ethernet or leased line access circuit with no back-up circuit

Copper sites have a per-site availability and rebates for failing to reach the agreed service levels:

- Availability – 99.80%, GTTF – 8 hours
- Service Rebate of 7% of site MRC for each hour of unavailability in excess of the committed availability pro-rated for part hours on a minute-per-minute basis.

As Copper sites are only connected with one circuit, there is no separate per-circuit availability service level. If the circuit is down, then the site is unavailable; the rebates for site availability cover both aspects.

GTTF Breach

For all site types and for all GTTF defined above, there is a rebate for failing to reach the agreed service levels for GTTF per event:

- Service Rebate of 2% of site MRC for each hour exceeding the GTTF per event pro-rated for part hours on a minute-per-minute basis.

Summary of site type variations

The following table summarises the variations between the five available access-type options to be considered for the RMDCN according to site type.

Site Type Variation	Platinum	Gold	Silver	Bronze	Copper
Platinum to Gold	Separacy not guaranteed SLA - 4H GTTF, 99.97% Availability				
Gold to Silver		Lower speed Backup circuit SLA - 6H GTTF, 99.95% Availability			
Silver to Bronze			Low grade Backup circuit SLA - 8H GTTF, 99.90% Availability		
Bronze to Copper				Single access circuit SLA - 8H GTTF, 99.80% Availability	

Figure 7: Variation in SLA between site types

Summary of access by site type

The following table summarises the five access types to be considered for the RMDCN. Clearly, the site cost increases from copper towards platinum, reflecting the improved network specification.

Site Type Access	Platinum	Gold	Silver	Bronze	Copper
Primary Access Circuit	Ethernet or Leased Line	Ethernet or Leased Line	Ethernet or Leased Line	Ethernet or Leased Line	Ethernet or Leased Line
Backup Access Circuit	Ethernet or Leased Line	Ethernet or Leased Line	Ethernet or Leased Line	xDSL/Wireless or Internet VPN	n/a
Primary & Secondary Bandwidth	Same Bandwidth on both Access Circuits	Same Bandwidth on both Access Circuits	Lower Speed Bandwidth on Backup Access	Lower Grade on Backup Access Circuits	Single Access Circuit with NO Backup

Figure 8: Access circuit summary for site types

Summary of site type resilience/separacy/diversity

The following table summarises the five available Resilience/Separacy/Diversity types to be considered for the RMDCN:

Site Type Resilience	Platinum	Gold	Silver	Bronze	Copper
Separacy	Full Separacy of the Circuits	Desired Separacy of the Circuits	Separacy of the Circuits not required	Separacy of the Circuits not required	No Separacy
Diversity	Full Diversity of the PoP's & Exchanges	Desired Diversity of the PoP's & Exchanges	Diversity of the PoP's & Exchanges not required	Diversity of the PoP's & Exchanges not required	No Diversity
Resilience	Dual CE's & Dual PE's	Dual CE's & Dual PE's	Dual CE's & Dual PE's	Dual CE's & Dual PE's	Single CE's & Dual or Single PE's
Active/Active	Optional	Optional	n/a	n/a	n/a

Figure 9: Separacy, diversity and resilience summary for site types.

For the platinum site type it is important to gain a full understanding of the circuit separacy from CPE to PE. This will involve surveys by the network provider. If a prospective platinum site delivery does not conform to the full separacy, diversity and resilience requirements, then that site should be classed as gold site type.

Summary of SLA by site type

The following table summarises the five availability service levels to be considered for the future RMDCN according to the site-type.

Site Type SLA	Platinum	Gold	Silver	Bronze	Copper
Primary Circuit SLA	99.90%	99.90%	99.90%	99.90%	n/a
Back-up Circuit SLA	99.90%	99.90%	99.90%	99.50%	n/a
Site SLA	100.00%	99.97%	99.95%	99.90%	99.80%
Site GTTF	2H	4H	6H	8H	8H
Site Availability Rebate	50% of MRC for each hour	20% of MRC for each hour	10% of MRC for each hour	7% of MRC for each hour	7% of MRC for each hour
Circuit GTTF	6H	6H	6H	6H (Ethernet and leased line) 24H (xDSL, wireless, Internet VPN)	n/a
Circuit Availability Rebate	2% of MRC for each hour	2% of MRC for each hour	2% of MRC for each hour	2% of MRC for each hour (Ethernet and leased line) 0.5% of MRC for each hour (xDSL, wireless, Internet VPN)	n/a
GTTF Rebate	2% of MRC for each hour				

Figure 10: Availability SLA summary for site types.

5.4. Potential configurations and commitment to connect to the RMDCN

During the preparation of their response to the ITT, the potential providers will base their commercial offer on, among other elements, the expected revenue they could get from the RMDCN. This revenue depends on the duration of the contract, the sites connected and the types (speed, SLA…) of configurations used.

Towards the end of 2011 ECMWF contacted all currently connected countries, in order to agree with them a list of "potential" configurations (e.g. up to five different options), and within that list a "preferred" one.

This list of configurations was to be as realistic as possible (that is, based on future requirements and available budget). The countries were also invited to make a commitment regarding their connection to the future RMDCN. It is important that any request for quotes in the ITT is reasonably close to the likely initial installation, both in terms of the specification of the configurations and of the countries involved.

5.5. Funding principles for the RMDCN

When the RMDCN was first established, it was decided that each country should pay for its own connection. However, when the network was migrated from Frame-Relay to MPLS, it was decided that no country would see its charges increased as part of the transition. In order to do so, a mechanism for redistribution of charges was agreed. When defined, the intention was for this to be a temporary solution, and now after the price reviews there is no longer any redistribution of charges.

As the pricing structure from OBS may not be the same as the pricing structure from another provider, it is now impossible to guarantee that all prices for all countries will go down as part of the new procurement. Hopefully, for a configuration equivalent to the one currently installed and thanks to the competitive element of the ITT, many countries will see the cost of their connection decreasing. However, this may not be the case for everyone.

Though recognising that an increase of cost will create an extra burden on some countries, and that they may decide not to join the RMDCN for this reason, the preferred option is to avoid any redistribution mechanism. By introducing up to 5 levels of configuration (Platinum, Gold, Silver, Bronze and Copper) it is hoped that each connected country will be able to select a solution that will be acceptable from both technical and financial aspects.

The principle that every site should be responsible for the cost of its connections should be maintained and any redistribution of charges between the connected countries, in order to assist some countries with their financial obligations, should be avoided or limited to a minimum.

5.6. The contract duration

The contract duration for managed data networks is generally around three to five years. However the situation of the RMDCN is very different compared to other companies contracting for networking services. The processes that need to be followed to procure a new network make it less flexible to change provider on short notice. Several arguments support the principle of a 3-year cycle:

- The lead time for a change of provider is around three years (this includes the whole procurement process and migration of the network).
- Evolution in the market has lead in the past to significant cost reductions and chances for technology upgrades around every three years.

The contract duration, the technical evolution of the network and the commercial adjustments should match this cycle. Based on a 3-year cycle the following scheme for the contract term has been envisaged as an appropriate option:

- Long term operational service of nine years with a break-point at the end of the sixth year;

- A technical and commercial refresh (TCR) with a guaranteed set of technology and/or cost benefits to the RMDCN that could be implemented at the beginning of year 4 of the operational service;
- A further technical and commercial refresh that could be implemented at the beginning of year 7 of the operational service, should ECMWF decide not to exercise its option to terminate the Contract after six years of operational service.

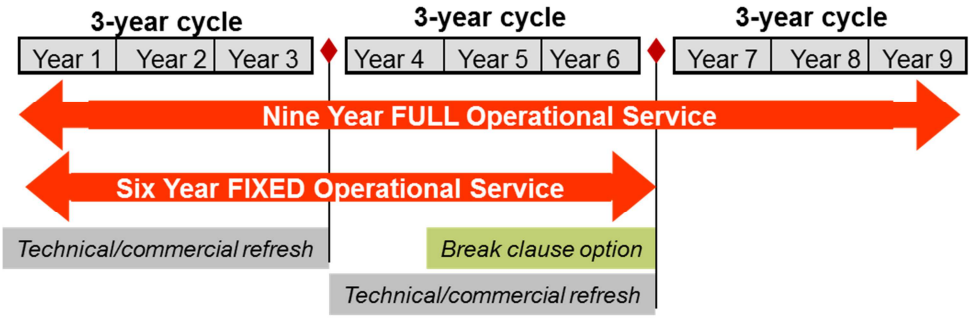

Figure 11: Full Operational Service and optional break clause

Based on the above, providers, using market definitions, will tend to include in the network contract:

- A six year initial term, with a pre-agreed TCR at the beginning of year 4.
- The potential to extend the contract for another three years with the same provider, along with another TCR.
- However, pre-agreed TCR activities must be specified for the beginning of year 4 to improve the services provided in line with requirements. Additionally, as part of the first TCR the supplier must provide a committed proposal for minimum bandwidth upgrades, service enhancements, and/or price reductions that could be implemented at the beginning of year 7 of the operational service (if the break clause is waived).

6. Glossary

CPE	Customer premises equipment. The device installed by the provider on the client premises.
DMVPN	Dynamic multipoint virtual private network is an enhancement of the virtual private network (VPN) configuration process of Cisco IOS-based routers.
GISC	Global Information System Centre.
GTS	Global Telecommunication System.
IMTN	Improved Main Telecommunications Network.
IPsec	Internet Protocol Security. A technology standard for ensuring the security and integrity of networks that use Internet Protocol. IPsec includes encryption and authentication technologies. It is a common element of VPNs (Virtual Private Networks) running over the Internet.
IPVPN	See VPN.
MTN	Main Telecommunications Network.
POP	Point of presence.
PVC	Permanent virtual circuit. A PVC is a virtual path through a network characterized by fixed endpoints defined by the network operator at service subscription.
RTH	Regional Telecommunication Hub.
Separacy	Separacy is defined as there being clear separation of the two access circuits to a dual-access site by having two completely separate access circuit routes from two different exchanges of the local access provider via separate ducts into the customer site. This ensures that a road digger, for example, could not bring down both links between the site and the network cloud in a single incident. Detailed surveys of both the site and the network path are needed to ensure that there is true separacy between the two access links. A network provider will generally not guarantee the separacy of access links, if a customer site does not have separate ducts to its premises.
SLA	Service level agreement is a negotiated contract between network providers and their subscribers. An SLA defines the criteria for the specific services that the subscriber expects the provider to deliver.
VPN or IPVPN	Virtual private network. A framework that provides private IP networking over a public infrastructure such as the Internet. In an IPVPN MPLS solution, a VPN is a set of customer sites that are configured to communicate through a VPN service. A VPN is a network in which two sites can communicate over the provider's network in a private manner; that is, no site outside the VPN can intercept their packets or inject new packets.
WIS	World Meteorological Organisation Information System.