



NEG functions and procedures

CLARA Network Engineering Group
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This document presents the purpose, functions and procedures of the Network Engineering Group (NEG) of CLARA, its relations with the other groups, and responsibilities to be followed by the NREN assigned to the task.

VERSION MANAGEMENT

This guide outlines the Network engineering Group functions. When new procedures are required or other changes made, it will be updated accordingly, and the new version release will be recorded in the table below.

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1. Introduction

The CLARA-NEG is responsible for the overall engineering of RedCLARA infrastructure, including planning, specification of hardware and software, and definition of technical policies and protocols to be adopted in the network, in order to be able to provide advanced IP services. The NEG's Mission is to develop RedCLARA as a state of the art backbone, offering services at the same or superior levels than those of advanced networks in other regions of the world.

The CLARA-NEG will be comprised by high level professionals, who will exercise overall responsibility for network planning, implementation and operation, including supervision of the CLARA-NOC, which includes the definition of how several of the CLARA-NOC functions are to be carried out, and the choice of adequate software and hardware to be used.

The CLARA-NEG reports to the CLARA's Executive Secretariat thru its Executive Director for the efficient operation of RedCLARA in accordance with the needs of the CLARA association, and directives from the CLARA Technical Committee communicated thru the Executive Director, under its advisory and supervisory activities.

The subsequent sections of this document describe the main activities performed by the CLARA-NEG.

2. Setup of RedCLARA

This section describes the tasks performed by the NEG during the initial setup of links and equipment. Whenever there is a new activation or a modification on the infrastructure services, the NEG will be responsible for specification, planning and activation of these services.

2.1. Setup of PoP infrastructure

The NEG is responsible for planning the implementation details of all Points of Presence (POP's), follow and verify the installation progress, test installation and acceptance, and general management and control of the assignment for equipment that has been acquired to build up the support infrastructure in any one of the RedCLARA existing or new PoPs.

Any PoP physical installation should be, in large extent, outsourced to one international services company selected accordingly to CLARA's Management Policies, or executed with the aid and on-site support from personnel of the LA-NREN established in the country where the PoP is located. This involves equipment transport and installation, its connections to the electric and telecommunication networks, the organization of wiring closets and patch panels, assembly of cables and connectors, air cooling devices set up, installation of racks, and other similar activities.

2.2. Acceptance of telecom links

The NEG will coordinate with the national networks and providers to follow up the installation of international links, making sure that each line is properly delivered, checking the initial value of all parameters agreed in the contract, and verifying the compatibility of interfaces and connectors. A link will be accepted once it is connected to any equipment full or co-administrated by RedCLARA, and the NEG is able to verify that the traffic can flow normally through the link within the expected parameters specified in the contract. The NEG document "CLARA/NEG/2004-0005 - Circuit testing procedure" will be the basis for the acceptance procedure.

2.3. Initial configuration

As soon as new equipment is installed and powered on, the NEG team will proceed with its initial configuration, directly or with the help of out-of-band access. This phase can be extended until the equipment starts its properly normal condition operation, with final configuration adjustments done when the operation in production starts. After this phase a procedure to handover the equipment to the NOC should initiate. The NOC will be thereafter responsible for the monitoring and reconfiguration of the equipment, according to new specifications that may emerge due to new engineering requirements.

3. Interaction with the NOC

This section describes the tasks required by the NEG to interact with the NOC group.

3.1. Definition of network management tools

The NEG will negotiate with the NOC group, in joint decision, the network management tools that will better suit RedCLARA's needs. The NOC, besides its usual tasks of attending to problem notifications and performing recovery procedures, must also control and make appropriate records of network availability and current quality of service parameters, such as packet loss, round trip delay and bandwidth availability.

A set of access control mechanisms must be implemented to allow the use of these tools in coordination with other LA-NRENs and international NOCs; collaboration projects task forces; measurements related working groups and initiatives; and any other interest group whose work might benefit or bring leverage to a Latin American performance database to be maintained by CLARA.

3.2. Definition of network information services

The NEG will work jointly with the Technical Committee and Workgroups of CLARA to define the information that must be available from the NOC, and will also work on the specification of the procedures and tools to implement them.

These information and tools will be used to monthly compute a set of performance indicators (to be defined), which will give an indication about the conditions of the network to support the traffic of the applications, with the expected quality of service needed by the clients.

3.3. Definition of maintenance activities

In conjunction with the NOC group, the NEG will establish and maintain a routine of activities required to the best performance of the network, as well as problem report procedures, failure recovery procedures, and procedures to scale the problems taking them to NEG whenever they cannot be solved in the NOC extent only.

Regular conferences and meetings between the two groups must be carried on, in order to ease the workflow and facilitate the communication. All joint and agreed decisions or procedures must be well and clearly notified to both group's mail lists, and documented for future reference.

3.4. Trouble Ticketing System

The NOC group must implement a "trouble ticket" tool to register and monitor failures notifications and other service demands, in particular the ones originated by the NRENs operators affiliated to CLARA. This tool will help NOC technicians in the open calls assistance, and also will allow the NEG to supervise and audit the quality of the support service. The members of NEG must be copied of all major events registered in the trouble ticketing system.

4. Advanced Services

One of the main responsibilities of the NEG is to promote the advanced IP services in the backbone of RedCLARA, in order to offer the best possible IP infrastructure support to the researchers. This section describes the activities of the NEG related to this commitment.

4.1. Routing policies and strategies

The NEG will establish a traffic routing strategy within the backbone in conformity with RedCLARA's use policies, as well as those of the other Regional and International Academic Networks. It is foreseen that RedCLARA's traffic will be entirely in agreement with the restrictive usage policies applying to the traffic among academic institutions, which forms the NREN's and the worldwide academic segment of Internetworking.

The routing policies will be published and made available to the LA-NRENs, and Web based tools, like "looking glasses", will be available allowing the routing policy implementation to be tested and verified.

The NEG will elaborate and publish documents specifying rules for route and prefix advertisement exchange between the NRENs, ITNs (International Traffic Networks), Regional networks and RedCLARA's backbone.

Peering policies, routing policies and other use policies will follow the "Acceptable Use Policy", approved by the General Assembly.

4.2.

Security policies and strategies

The NEG will establish and publish a group of minimum rules, policies and security measures to be followed by NRENs operators and by RedCLARA itself. These rules and measures aim to preserve backbone functionality, keeping it safe from Denial of Service (DOS) attacks and malicious activities of the same nature. It will also be created emergency intervention procedures whenever the NEG help is essential to a NREN in identifying the origin of an attack and blocking it. It is assumed that each national network will have its own security groups that will be able to receive and handle complains arising from its own users, as well as the worldwide academic community complains against its users. In this way, the security activities of the NEG will be limited, most of the time, to the prevention, intervention and defense of RedCLARA's core network, only acting in behalf of networks or individual users in special cases or when strictly needed.

4.3.

Special services

The NEG will coordinate with the Technical Committee for the feasibility study of differentiated services implementation strategies, and in promoting its implementation once the priorities are decided, based on the availability of resources, complexity, necessity and proficiency of the technicians involved in the implementation.

If proper support and capacity is available in the routers and data switching equipment used by RedCLARA, new services will be implemented followed by complete documentation made available by the NEG, allowing the promotion and dissemination of the knowledge to the NRENs, for them to be able to use and implement the service by themselves as well.

4.4.

Configurations for special events

During normal operation the network should respond adequately to all traffic demands, without the needing for major interventions. However, some demonstrations or experiments, with the requirement of great amount of network resources for a limited period, may need special technical support by RedCLARA.

Special short term configurations will be executed with the supervision and coordination of the NEG, upon the researcher's requests to the NEG, NOC or Technical Committee, since the request is provided beforehand and with enough time to analyze the alternatives and prepare the network for the experiment.

The exact procedures and rules for the requests, as well as request approving guidance, will be published by CLARA's Board.

4.5.

Performance measurement

The NEG will work jointly with the NOC group in order to establish a group of indicators and a series of procedures for measuring performance parameters, including network availability, packet loss, link delay and bandwidth usage. Part of the obtained information and graphics will be made available for public consultation through RedCLARA website.

The NEG will work together with the NOC and other International workgroups and task forces, in order to define the most adequate tools to capture and publish the information needed to build these indicators. Once the strategies are defined, the NEG will supervise the installation and operation of the tools, and regularly analyze and comment the results, issuing recommendations for corrections, upgrades or modifications whenever applicable.

5.

Regular tasks

This section describes the other activities executed by the NEG on a regular basis.

5.1.

Supervision of maintenance and service contracts

The NEG will exert control over third party service contracts: telecommunication services, equipment maintenance and software licenses. The contract execution will be followed up in close coordination and under the supervision of the Executive Secretariat who will request NEG's help to verify the discounts for interruption and other fees and penalties associated to the SLAs (Service Level Agreements).

5.2.

Documentation of processes and procedures

The NEG will organize and publish all the necessary and complete documentation for the coordinated operation of RedCLARA; implementation of hardware, links and services; evolution of the network infrastructure; and procedures for interaction with the NEG by the NRENs administrative, operational and engineering groups, as well as other groups from CLARA association.

5.3.

Technical recommendations

The NEG, whenever necessary, will prepare technical recommendations to the LA-NRENs affiliated to CLARA. It is expected that these recommendations will concentrate in the particular area of global routing within RedCLARA and its interactions with the international community of academic networks, such as:

- Compatibility between RedCLARA's global routing and other independent connections that the LA-NRENs may have with other networks;
- Compatibility between RedCLARA's global routing in accordance with other ITN's policies, and independent connections that the LA-NRENs may have with commercial Commodity Internet providers;
- Rules and procedures for route advertisement across RedCLARA to NREN borders;
- Rules and recommendations for deployment of innovative services, like IPv6 and multicast;
- Any other recommendations seen as appropriate by the Technical Committee.

5.4.

Interaction with LA-NREN staff

The NEG will keep excellent communication channels with the other participant network administrators, engineers and operators through mail lists, along with discussion groups, tasks forces and workgroups, all in which the NEG will take part and collaborate to leverage the knowledge and proficiency in the use of network technology. Likewise, the NEG will participate in forums periodically realized along with the affiliated networks technicians to the dissemination of information and to exchange experiences in the development of RedCLARA.

The NEG staff will work to be available for carrying on frequent short meetings, whenever necessary, using resources of IP video, web or audio conferencing systems, where available throughout the CLARA organization, especially the resources from the LA-NREN assigned with the NEG role.