

# **Specialized telecommunications system in the transmission of digital radiological images in hostile environments**

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## ***I- Short description of the proposer/s***

The international standard of transport and storage of radiological images - DICOM, the National Electrical Manufacturers Association (NEMA) - was formed to integrate the industry segment in favor of a single model of operation, aiming above all integration, customization and possible economy. This methodology combines virtues, mainly by excluding the proprietary view of previous systems.

The images of a radiological examination must be transmitted from source to receiver without interruption or delay, have a large volume of files and large size together (in megabytes). The international standard is designed to operate at optimum telecommunications environments - stable, secure and transmission rates of local networks.

In order to enable the practice of medicine where there is the presence of health professionals, Telemedicine seeks the creation of technologies that enable its activity. Conventionally, these physical environments also lack virtuous telecommunications systems.

The telecom environment in the State of Amazonas to clinical and hospital environments of the State Secretariat of Health of the Amazon is distributed via satellite to 128 kbps connections. The 62 cities of this state are in dense forest environments with high humidity, heavy rainfall and high rate of electrical storms.

Currently, even in the state of Amazonas, is in use in 44 units and in installation phase in the remaining 21 hospitals of the State Government, transmitting full digital mammograms beyond satellite to the Medical Report Center, located at the Hospital Francisca Mendes (Manaus/AM) of Federal University of Amazonas. The system has been customized to the case and is able to carry more than 380,000 exams per year, coming from the State Hospitals for Medical Reports Center.

A simulator of deployed communications equipment will be presented at the Congress, demonstrating its practicality and dynamism when compared to international systems.

## ***II- The details on the Demo, i.e. what technologies/ novelties/results/ prototypes will be shown***

Two demonstration scenarios will be presented, both using a conventional Internet access.

**1° scenario:** the operation of the communication system used will be demonstrated, with sending radiology images in DICOM, through the use of a specialized transmission equipment and a computer with software simulation of radiology's transmitter equipment. The proposed environment is a simulation that mounted in hospitals and clinics in the state of Amazonas, in the communication tests.

a) With the support of the State Department of Health of the Amazon, and in experiments conducted in person with satellite channels of 128 kbps, the equipment was capable of transmitting digital radiographic screening mammography in 6 minutes, while the international standard took almost

three hours (up to 30 times faster);

b) communication environment will be customized to simulate a satellite channel of 128 kbps, in transmission of radiological data to Center Reports, in operation at the University Hospital Francisca Mendes;

c) The transmissions will be made using the international standard DICOM and one developed by the author, allowing comparisons at the event.

**Conclusion:** It is expected to demonstrate the effectiveness of the model developed in hostile and comparative results during the event environment. Some reports and graphics will be presented for didactic purposes.

**2º scenario:** the software management communication network that monitors and manages, in real time, all the hospitals and integrated clinics will be displayed.

a) In the international DICOM standard is not expected and proposed a system of telecommunications management;

b) Integrates the entire network through private channels (VPNs) with local transmission equipment (installed in hospitals and clinics in the Amazon). Their software has been customized to have low consume in satellite network;

c) Its operation does not reflect technical impact and is easy to use by teams of healthcare professionals and technology of the State Secretariat of Health of Amazonas information;

d) Provides real-time, general conditions of local communication, transmission reports of examinations, tests and latest communications, etc.

**Conclusion:** Demonstrate that management models telecommunications networks can be useful after specific customizations also for telemedicine / teleradiology environments.

### ***III- If it is for the full duration of the conference; to be shown at the demos session; or both ways***

The presentation can be demonstrated using a cyclical and automated process. It is intended for pre-scheduled times if the researcher is available to the public for questions and other information. This way you can show the solution for the duration of the congress and / or in specific sessions.

Other media are also used pair publicize the project, such as posters, flyers, graphics, etc.

### ***IV- The details on the Demo experience, i.e. interactivity with audience, what user experience, which media means***

The presentation environment uses computer monitors for the demonstration environment, where each one will show on your screen your step in the process.

The researcher at pre-scheduled times will be available to answer questions from the public and technically detail of the process.

### ***V - The Demo technical requirements***

It will be needed to perform the demonstration. It will be usefull if the staff of the Congress can provide all or part of the equipments:

a) Table to the computers and others documents;

b) Electrical supply supports to the use of computers and network switch;

c) Provision of a Internet access, by LAN (not wireless).