EYERAD INSTALLATION MANUAL

Manual intended for technical personnel

EYERAD

Software for viewing and processing diagnostic images

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1 REVISION HISTORY

Date of this version: 10/07/2022

Versione	Data	Autore	Sommario dei cambiamenti	Pagine modificate
1.0	18/10/2017	Cristina Gatto	Initial version	
1.1	25/11/2017	Cristina Gatto	Manual changes and screenshots	
1.2	22/12/2017	Cristina Gatto	Chanced download instructions	6
1.3	12/11/2018	Cristina Gatto	Label modified	2
2.0	30/01/2019	Cristina Gatto	EyeRad version 3.0	
2.1	20/11/2019	Cristina Gatto	Changed EyeRadSrv.xml Added configurator chapter	
2.2	16/01/2020	Cristina Gatto	Added security and privacy paragraph	
2.3	23/11/2020	Cristina Gatto	Added info for a new version upgrading	
2.4	20/07/2021	Mirjeta Nikaj	Changed EyeRadCfg interface+UDI	
2.5	10/07/2022	Mirjeta Nikaj	Label modified	2

2 INSTALLATION MANUAL

This Installation Manual is intended for **technical personnel** who must install and configure the **EyeRad** program.

The technical personnel in charge of the installation must have knowledge of the DICOM protocol and of the operating systems on which they must operate to configure the **EyeRad** program.

They also need to have basic skills related to network configuration.

For the installation, it is recommended to have an internet connection available, not necessarily on the PC where the program will be installed, allowing you to have the release of the user license in real time.

2.1 WARNINGS

It is recommended to place the workstation with the **EyeRad** program in an environment suitable area for the activity that aims to carry out and to apply those standard precautions for the computers use:

- in the areas intended for reporting, there must be adequate air flow, optimal temperature and humidity control;
- the display conditions must be optimized in order to minimize visual fatigue by controlling the lighting of the reporting room in order to eliminate the reflection on the monitors and decreasing the ambient lighting level as much as possible without completely eliminate it;
- noise from the computer and other peripherals must be kept to a minimum;
- must be used suitable chairs with lumbar support;
- the desk where the keyboard, mouse and monitor are positioned should be height adjustable; monitors should be positioned to maintain an arm's distance between the display and the user.

Users are advised to take breaks during the reporting work.

For the computer where **EyeRad** is installed, it is recommended to:

- connect the hardware to a UPS to avoid possible damage to the database and / or configuration data;
- keep updated the hardware on which EyeRad is installed and its operating system;
- follow the basic recommendations for a good use of the computer with a Windows operating system (turn it off when it is not used), if you don’t use **EyeRad** it’s better to exit the **EyeRad** program.

Each **EyeRad** function is equipped with error messages and any suggestions for resolving the non-compliant action.

Due to limitations in data acquisition, that don’t depend on the program, EyeRad cannot guarantee that the measurements for projective modalities, such as Digital Radiography (DX), Computed Radiography (CR), Intra-oral Radiography (IO) and Mammography (MG) image, will be accurated.

Warning: EyeRad cannot guarantee the accuracy calibration of data received from diagnostics. We cannot guarantee that a manual calibration from the user has been done accurately.

2.2 SECURITY AND PRIVACY

Conformity with the GDPR (EU REGULATION 2016/679) regarding the security and protection of personal data is devolved to the operating system (Windows) and to the rules imposed by the system administrator of the company where the product is used.

The credentials are managed internally, encrypted within the application database. The first time that Users are in possession of the credentials, must change the password at the first access respecting the criteria of generation and conservation of passwords suggested by the belonging company.

For performance and compatibility reasons, the database and the DICOM files stored in the PC file system where **EyeRad** is installed are not encrypted, therefore is recommended, for the physical security of the computer, to protect the access.

2.3 INTRODUCTION

EyeRad is a digital workstation for radiological reporting, created to meet the efficiency and the precision required for a **radiological** workstation.

Key features of **EyeRad** are quick access to images and data, integration with existing PACS / RIS, ease of use and flexibility.

EyeRad uses the use of **high-resolution LCD** monitors, 2-3-5 MPixel.

2.4 SUPPLIED ACCESSORIES

2.4.1 SETUP

Installation from ftp of EyeRad version 3.0.

2.4.2 LICENSE

The use of the program is allowed only after the activation of a license of use.

2.5 INSTALLATION

To download the setup (EyeRadSetup-3.x.x.x file, with latest version of EyeRad instead of x.x.x), access the **Download** section of the institutional website (www.gsquared.it), which is displayed as a submenu of the **Support** menu item only once you have entered the protected area, which can only be accessed by registered users through the site. At this point the user can download the setup file by following the navigation instructions in the reserved area.

Once downloaded, launch the executable by selecting "run as administrator" on the Personal Computer chosen to install the program, **from an account with Administrator privileges**: a guided setup will allow you to install the **EyeRad** suite on the PC.

The default database folder is created in **C:\EyeRad** (user can change during installation this folder) and the two databases used by EyeRad (EyeRadSrv.fdb and Secrets.fdb) are copied there.

In %**ProgramFiles**% the **EyeRad** folder (user can change during installation this folder) is created and copied there the files necessary for the operation of **EyeRad**.

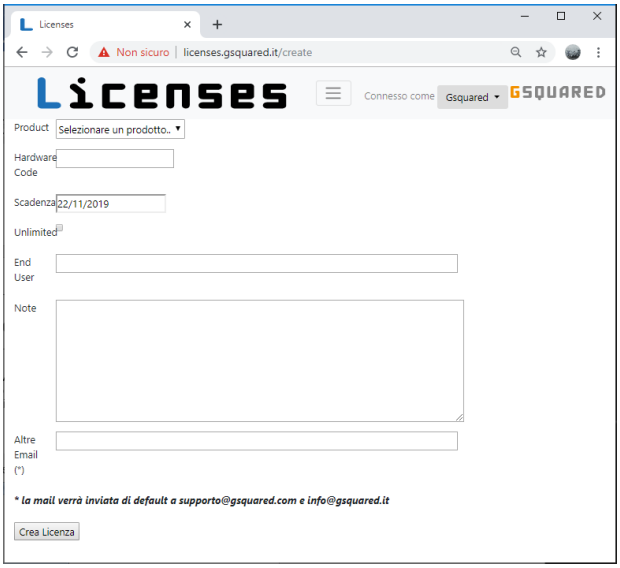
In addition, the setup installs:

- Visual C ++ 2017 x64Redistributable (if necessary)
- Firebird relational database (version 2.5 for Win64)

On the desktop is created a shortcut to the program.

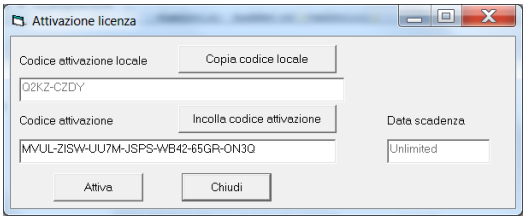
At the end of the **EyeRad** installation, the **EyeRadLogin.exe** program opens automatically, which allows the user to activate the license. If the user does not want to activate at the time of installation, he can close this program and relaunch it at any other time (it is present in the EyeRad installation folder) with the foresight to launch it as a system **administrator** (right button mouse over the icon and from the context menu choose ***run as administrator***).

Opening **EyeRadLogin.exe** the user will only have to select the menu item "License activation" (**you do not have to enter your username and password and give ok, because this only checks the license and if the license has not yet been activated it gives error**). In the pop-up that opens, the user can check the local installation code, copy it and with that go to the website dedicated to the management of **EyeRad** licenses (https://licenses.gsquared.it/), where, after having authenticated (credentials are sent by email after making an explicit request to G-Squared), you can request to activate a new license and obtain the release of a valid license key.



The Activation Code is released by connecting to the site.

Once this code is received, simply copy it into this screen using the **Paste activation code button** and then activate the license by pressing the **Activate button**.



2.6 UPGRADING TO A NEW VERSION

We understand the importance of providing the best possible update experience to help users to interface with Eyerad.

To correctly enrich the software with the newest features it is important to follow these steps:

1. Stop the EyeRadSrv and shut down the program EyeRadMonitor
2. If necessary, take a backup of your installation file in (C:\Programmi\EyeRad)
3. Run the setup
4. Copy paste from the backup file the following scripts:
   - EyeRad.ini
   - EyeRadSrv.xml
5. Other files for a personalized experice (layout, actions, etc)
6. Restart the service EyeRadSrv

2.7 SYSTEM CONFIGURATION

Before launching the program, the system administrator will have to set some configuration parameters in the same folder where the program was installed, in order to customize the program according to user requests.

The first time the program is activated, the DICOM part of the system must be configured using the **EyeRadCfg** configuration program and/or the **EyeRadSvr.xml** configuration file.

Once this is done, the **EyeRad.ini** file must be modified to display the information in the program (service monitor position, information to be displayed on the images - overlay, etc.).

It will be possible to subsequently set up a workflow by modifying the files in the **hangingprotocols** and **layouts subfolders**.

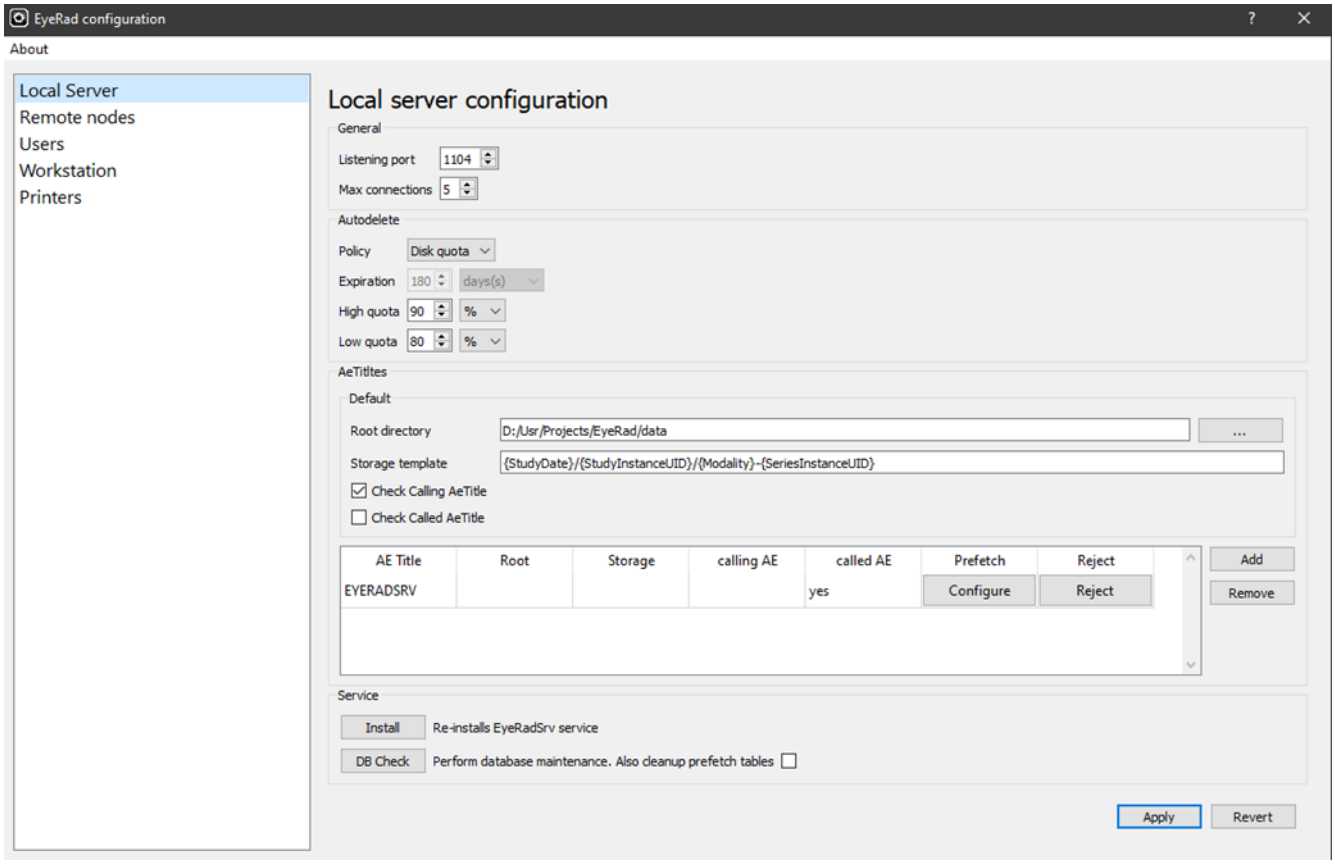
2.7.1 EYERADCFG

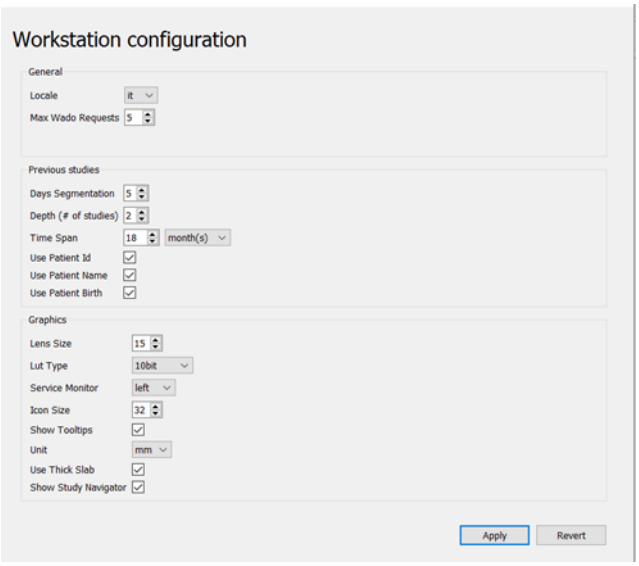
By launching the **EyeRadCfg** program, the user can easily configure the main data relating to the local node, remote nodes, prefetch, users, some workstation configurations.

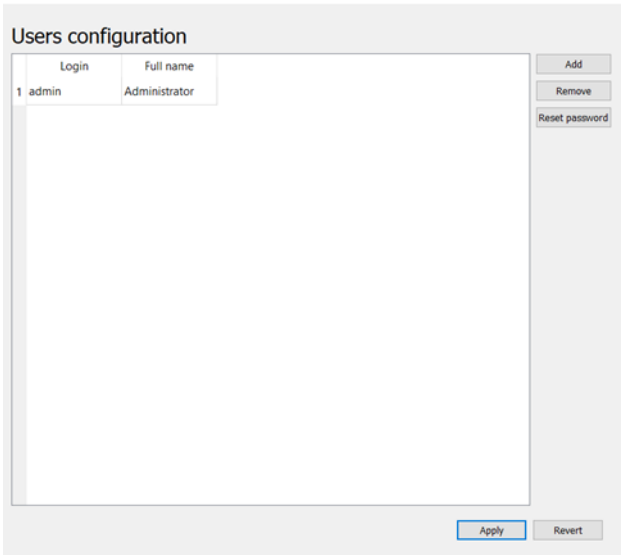
Below are the screens as they appear, the meaning of each field to be set is shown in the comments of the **EyeRadSrv.xml file**.

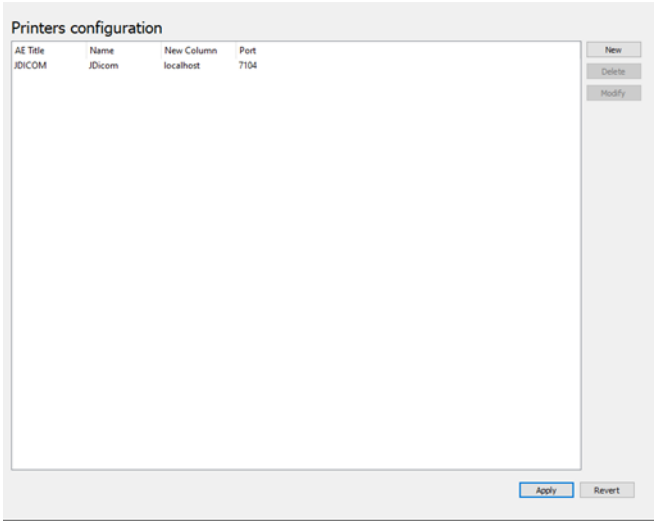
The DICOM configurations necessary for the operation of **EyeRad** are stored in the **EyeRadSrv.xmls** file.

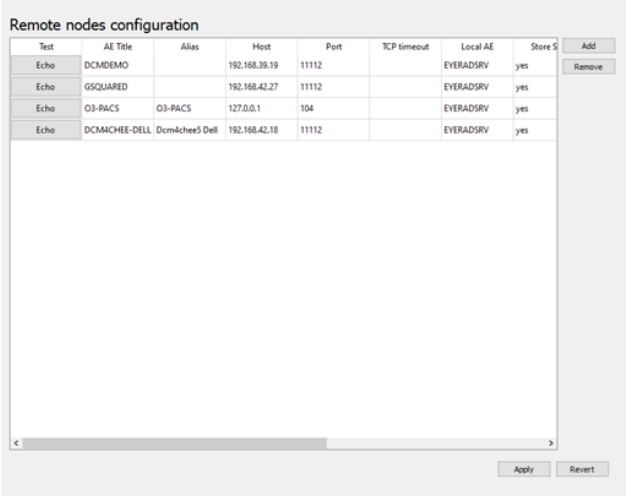
Some of the settings in the file can be changed using the **EyeRadCfg** program directly.











2.7.2 EYERADSRV.XML

```
<?xmlversion="1.0"encoding="utf-8"?>
<EyeRadSrv
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:noNamespaceSchemaLocation="../pstServer/pstServer.xsd"
    ver="1.0"
    baseUID="192.1322.232.1222124.34434"
    imageArchiveAe="PACS"
    institutionName="G-Squared Institute"
    workstationName="EyeRadServer"
    useSystemBus="no"
    caseInsensitiveDICOMDIR="yes">

<databasedriver="QIBASE"options=""host="localhost"port="3050"user="sysdba"password="masterkey"
    name="D:/Usr/Projects/EyeRad/eyeradsrv.fdb"/>
    <!-- configurazione del server locale -->

    <localServerport="1104"maxConnections="5">
        <!-- impostazione regole per la cancellazione automatica degli studi al raggiungimento di determinati criteri
        policy     = regola da utilizzare per l'autodelete (diskQuota / expiration)
        expirationPeriod = periodo massimo di permanenza degli studi nel server locale se è stata impostata la cancellazione
                           automatica degli studi con policy expiration
        highDiskQuota     = valore massimo di occupazione disco consentita prima di iniziare la cancellazione degli esami e
                           fermarela ricezione da altri nodi con policy diskQuota
```

```
          lowDiskQuota     = quantità di spazio da liberare se è stata impostata la cancellazione automatica degli studi con policy
                             diskQuota
          -->
        <autodeletepolicy="diskQuota"highDiskQuota="90%"lowDiskQuota="80%"expirationPeriod="180d"/>

<!-- script con le regole da applicare alla fine della ricezione di uno studio *** da non toccare ***
           -->
<scriptSet>
<scripttrigger="onStudyEnded"url="file:C:/Program Files/EyeRad/onStudyEnded.js"/>
</scriptSet>

    <!-- Transfer Syntax accettate dal server oltre LittleEndian Explicit e Implicit
          -->
        <acceptedTransferSyntaxes>
            <tsuid="1.2.840.10008.1.2.4.50">JPEG Baseline (Process 1)</ts>
            <tsuid="1.2.840.10008.1.2.4.70">JPEG Lossless, Nonhierarchical, First- Order Prediction (Processes 14 [Selection Value
1])</ts>
            <tsuid="1.2.840.10008.1.2.4.80">JPEG-LS Lossless Image Compression</ts>
        </acceptedTransferSyntaxes>

    <!-- Configurazione di default del server
        checkCalledAE  = se yes il server controlla se AE Title chiamato è definito nell'associazione
        checkCallingAE = se yes il server controlla se AE Title chiamante è definito nell'associazione
        root           = cartella di root dove vengono salvati gli esami
        storage        = impostazione di come vengono impostate le cartelle dovengono archiviati gli studi
        timeout        = tempo di timeout sulla connessione
          -->

<defaultAeConfiguration
            checkCalledAE="no"
            checkCallingAE="yes"
            timeout="15"
            storage="{StudyDate}/{StudyInstanceUID}/{Modality}-{SeriesInstanceUID}"
            root="D:/Usr/Projects/EyeRad/data"/>


    <!-- configurazione DICOM del server
            aetitle        = AE Title del server
            checkCalledAE  = se yes il server controlla se AE Title chiamato è definito nell'associazione
            coerce         = sovrascrive i dati anagrafici presenti nel db con l'ultima immagine arrivata dell'esame se impostato su
                             workstation
                           = modifica i dati anagrafici dell'oggetto DICOM ricevuto con i dati anagrafici presenti nel DB se impostato
                             su server (*** da non utilizzare ***)
            -->

        <aeConfigurationaeTitle="EYERADSRV"checkCalledAE="yes"coerce="workstation">

            <!-- configurazione da utilizzare per impostare il pre-fetch degli studi precedenti presenti in nodi DICOM remoti
                 depth               = quanti studi precedenti da ascaricare che soddisfino il timespan
                 timespan            = quanti anni di precedenti da scaricare
                 retryInterval       = imposta quante volte tentare il prefetch (se questo fallisce) e dopo quanto tempo (se ne
                                       possono mettere n )es. 1x10m,2x1h significa tenta 1 volta dopo 10 minuti e, se fallisce,
                                       tenta due volte con un intervallo di 1h tra una volta e l'altra
                 usePatientName      = imposta se utilizzare o meno il nome paziente per ricercare i precedenti dai nodi remoti
                 usePatientBirthDate = imposta se utilizzare o meno la data di nascita del paziente per ricercare i precedenti dai
                                       nodi remoti
                 usePatientId        = imposta se utilizzare o meno l'ID del paziente per ricercare i precedenti dai nodi remoti
                 enabled             = abilita o meno la regola di prefetch
                -->
            <prefetch
                depth="6"
                timespan="4y"
                retryInterval="1x10m,2x1h"
                usePatientName="n"
                usePatientBirthDate="y"
                usePatientId="y"
                enabled="yes">

        <!-- imposta i nodi remoti in cui ricercare i precedenti secondo la regola di prefetch -->
                <dicomNodesSet>
                    <!--dicomNode aeTitle="PACS1"/-->
                    <dicomNode aeTitle="PACS2"/>
                </dicomNodesSet>

                <!-- imposta le condizioni di ricerca degli studi da recuperare con il pre-fetch
                      nell'esempio sotto riportato il server cercherà nei nodi remoti tutti gli esami con modalità MG o CT di un
                      paziente, rispettando le regole di prefetch sopra impostate
                    -->
                <seriesConditionSet>
                    <matchAny>
                            <matchAll>
                                    <condition vr="(Modality)" op="=" value="MG"/>
                            </matchAll>
                            <matchAll>
                                    <condition vr="(Modality)" op="=" value="CT"/>
                            </matchAll>
                    </matchAny>
                </seriesConditionSet>
                <!-- imposta le condizioni di ricerca delle sop instances da recuperare con il pre-fetch
                     I VR supportati sono (poi dipende dal PACS):
                         - ImageType
                         - SOPClassUID
                -->
                <sopConditionSet>
                    <matchAny>
                        <matchAll>
                            <condition op="&lt;>" value="1.2.840.10008.5.1.4.1.1.7" vr="(SOPClassUID)"/>
```

```
                        <condition op="&lt;>" value="1.2.840.10008.5.1.4.1.1.1.2.1" vr="(SOPClassUID)"/>
                    </matchAll>
                </matchAny>
            </sopConditionSet>
        </prefetch>
        <!--
            SOP Instances matching the following criteria (see also <prefetch>) are accepted but not stored
        -->
        <rejectConditionSet>
            <matchAny>
                <matchAll>
                    <condition op="=" value="CT" vr="(Modality)"/>
                    <condition op="&lt;>" value="BREAST" vr="(BodyPartExamined)"/>
                </matchAll>
            </matchAny>
        </rejectConditionSet>
    </aeConfiguration>
</localServer>

<!-- elenco dei nodi DICOM remoti abilitati -->
<dicomNodes>
    <!-- configurazione nodo DICOM remoto
        aeTitle      = AE Title del nodo in questione
        host         = indirizzo IP del nodo che si sta configurando
        port         = porta di ascolto del nodo che si sta configurando
        alias        = alias che compare sulla lista dei nodi DICOM in EyeRadQR
        localAETitle = AE Title con cui il server si presenterà al nodo DICOM
        queryScp     = controllo se il nodo remoto è C-FIND SCP e può essere interrogato
        storeScp     = controllo se il nodo remoto è C-STORE SCP e può ricevere immagini
        wado         = eventuale stringa WADO per il richiamo delel immagini dal nodo remoto
        -->
<dicomNodeaeTitle="DIAGNOSTICA1"host="192.168.1.19"port="104"localAeTitle="EYERADSRV"queryScp="no"storeScp="yes"wado="">
        <!-- impostazioni chiusura studio
             policy  = policy di chiusura studio, che indica la fine di invio di un studio (valori possibili timeout/disconnect)
             timeout = tempo di attesa per considerare lo studio completato, se policy termination è impostata su timeout
            -->
        <studyTerminationpolicy="disconnect"timeout="10m"/>
        <!--storageCommitment aeTitle="STGCMTSCP" timeout="1h"/-->
    </dicomNode>
<dicomNodeaeTitle="PACS1"host="192.168.1.242"port="11112"localAeTitle="EYERADSRV"queryScp="yes"storeScp="yes"wado="">
<studyTerminationpolicy="disconnect"timeout="1m"/>
        <!--storageCommitment aeTitle="STGCMTSCP" timeout="1h"/-->
    </dicomNode>
</dicomNodes>
</EyeRadSrv>
```

2.7.3 EYERAD.INI

EyeRad display configurations are saved in the **EyeRad.ini** file, such as the position of the service monitor, the use or not of some particular tools (**ThickSlab**), rules for loading the previous ones present in the local DB, icon sizes, information visible on the images.

The overlay section [**overlayLabels**], the information displayed on the images, contains a default part, with the generic data to be displayed, and a series of "specialized" sections for each mode: these are identified by the general name **overlayLabels** followed from **- "mode"**, therefore the user wants to show different information for mammography, he will have to set the section [**overlayLabels-MG**]. For the other modes we will proceed with a similar criterion.

```
[EyeRad]
registrationsPath=C:/Usr/Projects/EyeRad/data/registrations
scriptPath=
locale=it
autoOpenDICOMDIR=false
wadoMaxRequests=5
splash=

#   lutType =totoku|10bit|*
#   totoku=only for monochrome totoku monitors, 12 bitlut table
#   10bit=works only for NVIDIA quadro, AMD firepro, ATI WX Pro cards
lutType=10bit

# Size of lens in [cm]. The size is adapted to the monitor's DPI
lensSize=15

# cacheMode = RAM|NumImages|None
#   RAM=Use cacheSize of RAM before flushing to cache
#   NumImages=Use cacheSize number of images before flushing to cache
#   None=Don't use caching
# cacheSize = RAM->kb to use (i.e. 1024) or % of available RAM, not free but available RAM (i.e. %50) (def=%75 or 4)
cacheMode=none
cacheSize=%50
MaxWindowCount=3

# position of service monitor left|right
serviceMonitor=left
```

```
# use ThickSlab or not
useThickSlab=true

# parameters to control EyeRadQR precedents fetching
# number of days to consider a study as a previous
DaysStudiesSegmentation=5
# max number of precedents
depth=2
# max time span of precedents
timeSpan=1.5y
# Use patient id to identify precedents
usePatientId=y
# Use patient name to identify precedents
usePatientName=y
# Use patient birth date to identify precedents
usePatientBirthDate=y

[toolbars]
#Specify the pixel size of the icon in toolbar | default 62 (Qt's default)
iconSize=62

[tools]
foreground=0,255,0
width=1
font\family=Arial
font\size=11
font\weight=75

[overlayFont]
# unit=mm|cm|in
unit=mm
font\background=0, 0, 0
font\family=Tahoma
font\foreground=255, 255, 255
font\size=9
font\weight=40

[overlayLabels]
disableRuler="n"
disableOrientation="n"
bottomLeft\1="W/L ${voi,%d/%d}"
bottomLeft\2="${vr,0x00080080}"
bottomRight\1="Img. ${image}/${numImages} ${frame}"
bottomRight\2="FOV ${fov,%.2f %.2f}"
topLeft\1="${vr,0x00100010}"
topLeft\2="${vr,0x00100030}"
topLeft\3="${vr,0x00100020}"
topLeft\4="${compression}"
topLeft\5="${pixelSizeType}"
topRight\1="${vr,0x00080060}"
topRight\2="${vr,0x00080022}"
topRight\3="${vr,0x00185100}"

[overlayLabels-MG]
disableRuler="n"
disableOrientation="y"
bottomRight\1="W/L ${voi,%d/%d}"
bottomRight\2="${vr,InstitutionName}"
bottomRight\3="Img. ${image}/${numImages} ${frame}"
bottomRight\4="FOV ${fov,%.2f %.2f}"
topRight\1="${vr,PatientName}"
topRight\2="${vr,PatientBirthDate}"
topRight\3="${vr,PatientID}"
topRight\4="${vr,StudyDate}"
topRight\5="${previous}"
topRight\6="${position}"
topRight\7="${compression}"
topRight\8="${pixelSizeType}"
```

2.7.4 FOLDER HANGINGPROTOCOLS

In the **hangingprotocols** folder, which is located in the installation folder of the **EyeRad** program, there are **xml** files containing the arrangement of the toolbars in the program and the layouts defined for that specific workflow.

Each xml file identifies a workflow, identifying which layouts files (present in the **layouts** folder) should be loaded and in what sequence.

Below the example of the work flow for mammograms with tomosynthesis (**mammo.xml**):

```
<hangingprotocolname="Refertazione senologica con tomosintesi">
          <toolbarname="basic"line="0"/>
          <toolbarname="correlation"line="0"/>
          <toolbarname="layout"line="1"/>
          <toolbarname="history"line="1"/>

          <layoutname="Cranio Caudale &amp;amp; Obliqua"default="CC-MLO"/>
```

```
        <layoutname="Cranio Caudale 2D TOMO"default="CC-TOMO"/>
        <layoutname="Obliqua 2D TOMO"default="MLO-TOMO"/>
        <layoutname="Cranio Caudale"default="CC"/>
        <layoutname="Obliqua"default="MLO"/>
        <layoutname="CC + MLO + Precedente"default="OVERVIEW"/>
</hangingprotocol>
```

The **hangingprotocols.js** file contains functions to identify the images that are being loaded and which workflow must be loaded by type of study (modalities present in the study):

```
function getHangingProtocolName(pool) {
        //Should analyze input and return the name of the HangingProtocol xml file to load. Template for test.
        var modalities=[];
        pool.sopSeriesList().forEach( function(elem) {
                this.push( elem.ddo().value(0x0008,0x0060)[0] ); // Modality
        }, modalities );

        if ( modalities.indexOf("MG")!=-1 )
                if( modalities.indexOf("US")!=-1 )
                        return"mammo_us";
                elseif( modalities.indexOf("MR")!=-1 )
                        return"mammo_mr";
                else
                        return"mammo";

        return"default";

}
```

2.7.5 LAYOUTS FOLDER

In the layouts folder, which is located in the installation folder of the **EyeRad** program, there are **xml** files containing the arrangement of the series and images located in each defined layout.

Each file has a "speaking" name, easy to interpret for the technician who wants to modify its content.

At the top of the file there is a small description of the layout that it represents.

Below the example layout defined when there are 2D Cranio Caudal images and the corresponding 3D images (**cc-tomo.xml**):

```
<!-- Cranio caudal 2D - Cranio caudal 3D = on left monitor CC (Right CC+Left CC), on right monitor CC 3D (Right CC 3D +Left CC 3D).
     In this case left monitor = 1 right monitor = 2.
          It depends on windows settings -->

<layout name="CC-TOMO">
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<action><![CDATA[ flipOrientation(); ]]></action>
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<screen monitor="right"
<layout="1x2">
<grid rows="1" columns="1">
<rule><![CDATA[ isCC() && isRight() && is3D() ]]></rule>
<action><![CDATA[ flipOrientation(); ]]></action>
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<rule><![CDATA[ isCC() && isLeft() && is3D() ]]></rule>
</grid>
</screen>
</layout>
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