Data exchange with OAE-device

for use in the Dutch hearing screening program

Data exchange with OAE-device

for use in the Dutch hearing screening program

Content

1 Introduction

Neonatal hearing screening is implemented nationwide in the Netherlands since 2006. In the current situation all newborns are screened in three sessions, using Transient Evoked Oto Acoustic Emissions (TEOAE) screening (Echoscreen by Natus Medical Inc.) in the first two sessions and Automated Auditory Brainstem Response (A-ABR) (Algo portable or Algo 3[i] by Natus Medical Inc.) in the third session.
All patients that have to be tested, and the test results are stored in CANG by means of data communication. CANG is a web-based administration program that is used nationwide to facilitate and monitor the national hearing screening program .

The OAE-device does not have to communicate directly with CANG, but must be able to exchange information with the communication software from the NSDSK on a Windows 10 PC or laptop.
This document gives an outline of the communication between the OAE-device and the communication software, and the general requirements of an OAE-device to enable this communication.

2 Communication with CANG

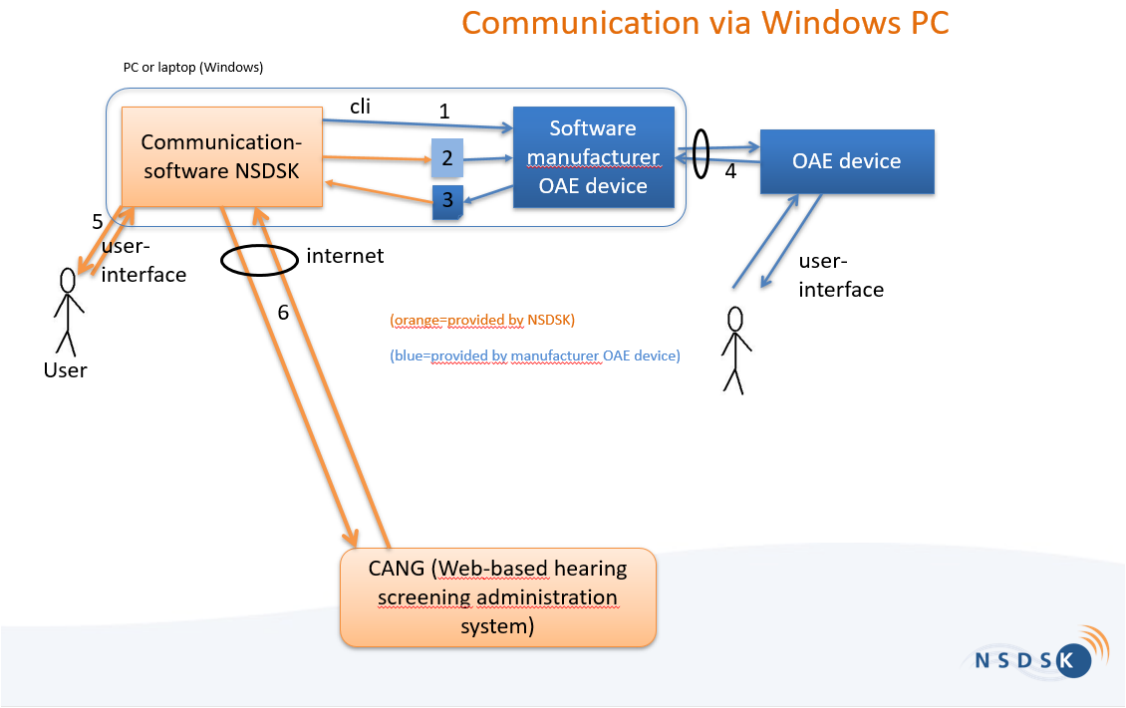
The OAE-device has to communicate with the CANG-system regularly, mostly at the beginning and at the end of the day. This is to make sure the device contains the newest data of patients that have to be screened, and to ensure that CANG contains the most actual result of the screening.

The screener needs a Windows laptop or PC, with Communication software for communication with CANG with integrated[1] software for communication with the OAE device. The communication software is provided by NSDSK. The software to communicate with the OAE device is provided by the manufacturer of the device (see picture below). Once the OAE-device is connected to the laptop, the screener can start the communication.

To understand the data exchange between CANG and OAE device, this is what the communication software NSDSK does in a nutshell (see picture below):

- It gives the software from the manufacturer of the OAE device the command (1) to read data (4) from the OAE device
- the software from the OAE device manufacturer makes this data available by saving it in a XML file (3)
- the communication software from the NSDSK reads the XML file (3) and sends it (6) to CANG
- CANG will process the data and sends new data for the OAE device back (6) to the communication software.
- the communication software from the NSDSK saves the data for the OAE device in a XML file (2) and gives the software from the manufacturer the command (1) to read the XML file and store the data on the OAE device (4)
- The communication software provides the user interface (5) The software from the manufacturer of the OAE device has no visible user interface (apart from the command line interface that is used by the communication software, but the user is not aware of this)

[1] Integrated means in this context that the user is not aware of two pieces of software: the user 'sees' only the communication software from the NSDSK



3 User interface OAE device

The user interface is described, solely to emphasize the importance of some data that is exchanged with the device, not as a detailed manual how the device should be used. The interface must allow these options to provide all the information that is required. The screener needs the user interface of the device for the following actions:

1. The user (screener) has to login on the OAE-device by typing its username, or selecting it from a list and then type a personal password (5 x numeric).

2. The user has to select the screenings location from a pre-defined list of locations e.g. “at the patient at home” or “at the well care clinic xx”

3. The user can select the patient to be screened from a list of patients.

4. If the patient to be screened is not in the list, the user can manually insert a new patient.

5. The user can now start the screening

6. After the screening, the user can add comment about the screening or the patient. The user can choose the comment from a predefined list of comments, or add the comment as free text.

7. If the screening is cancelled, the user can add a comment about this.

8. The user cannot change any patient data except when inserting a new patient, or when adding comment to a patient

4 Required functionality software manufacturer OAE device

The manufacturer of the OAE device also has to provide software to communicate with the OAE device from a Windows computer.

- This software consists of one or more executables on the computer that can be called from the Windows command line (DOS). Withthe executable(s) it is possible to give the command to read data from the OAE device or to write data to the OAE device. It must be possible to place the executables in a subdirectory of the communication software from the NSDSK and it should not need to be installed, so that it can be part of the installation of the communication software of the NSDSK.
- This software does not have any other visible user interface on the screen (the user interface is within the communication software of the NSDSK)
- This software can read data from a XML file on the computer and store the data in the OAE device
- This software can read data from the OAE device and store it in a XML file on the computer

4.1 Command to connect with the OAE device

This command must be able to initiate communication with the OAE device that is connected tot the computer. Once connection is established there is a message on the screen of the OAE device that there is a communication in progress. After initiating the communication, it is possible to use the other commands described below. To prevent unauthorized connections with the device a password should be given as a parameter.
Executable name: connect.exe
Parameters: password
Example call: “connect gfui453_ioutgf”
Return value if successfully connected: “OK”
Return value if not connected: Error message

4.2 Command to set current date and time of the OAE device

This command sets the current date and time of the OAE device. This way it is possible to adjust the internal clock of the device that is used for register the time and date of tests that are done.

4.3 Command to clear data of the OAE device

This command clears:
-patient list (see 4.4.4)
-Manually added patients since previous? communication (see 4.5.3)
-testresults (see 4.5.4)
-New comments since previous? communication (see 4.5.5)

4.4 Command to write data to the OAE device

This command must be able to read data from one ore more XML files on the windows computer and write the data to the OAE device. The data written should overwrite the data that is already present on the device. So, writing a new patient list e.g. should overwrite the existing patient list (and the testresults belonging to the existing patient list should be cleared) The command must be able to write the following data:

4.4.1 Configuration information

This are all configuration options that can be set to configure the device. This way its always clear how the device is configured.

4.4.2 Users list

This is a list of users that can log in to the device. The user types in a username or selects it from a list of names. Minimal set of information:

User-ID	ID for user
Username	username to log in
Password	password to log in

4.4.3 Location list

This is a list of locations where the OAE device is used. After login the user selects a location. Minimal set of information:

Location-ID	Unique ID for the location
Location name	name of the location

4.4.4 Patient list

This is a list of patients that have to be tested. Minimal set of information:

Patient-ID	unique patient-ID
Manually-added	no
Manually-added-by	not applicable
First name	first name of the patient
Last name	last name of the patient
Gender	gender of the patient
Telephone number	telephone number of the patient
Information	some general information of the patient
Date of birth	birth date of the patient
Street	streetname where patient lives
Housenumber	housenumber where patient lives
Zipcode	zipcode where the patient lives
City	city where the patient lives
Previous testresult1	free text field to place former test results (minimum length 50 chars)
Previous testresult2	free text field to place former test results (minimum length 50 chars)
Previous testresult3	free text field to place former test results (minimum length 50 chars)
Previous testresult4	free text field to place former test results (minimum length 50 chars)
Previous testresult5	free text field to place former test results (minimum length 50 chars)
Previous testresult6	free text field to place former test results (minimum length 50 chars)

4.4.5 Comment Lists

It must be possible for the user to place a comment (see 3.6 / 3.7) by typing it as free text and/or by selecting it in a predefined list . Minimal set of information for the predefined list:

Comment-ID	ID of the comment selected
Comment text	text of the comment-item

4.4.6 Date/Time last successful communication

This is the date and time of the last time that a successful dataexchange has taken place between the OAE device an the communication software of the NSDSK. This date and time are set by the communication software itself.

4.5 Command to read data from the OAE device

This command must be able to read the following data from the OAE device and save it to one ore more XML files on the Windows computer:

4.5.1 Unique Serial/ID connected OAE device

This is an unique alphanumeric ID and/or serial that identifies the device

4.5.2 Date/Time last successful communication

This is the date and time of the last time that a successful dataexchange has taken place between the OAE device an the communication software of the NSDSK. This date and time are set by the communication software itself (see 3.5)

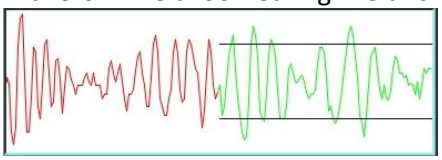
4.5.3 Manually added patients since last communication

It must be possible to manually add patients that are not already present in the device. It must be possible to read this manually added patients. It must be clear that the patient is manually added.
Minimal set of information:

Patient-ID	automatically generated unique patient-ID
Manually-added	yes
Manually-added-by	the user that manually added the patient
First name	first name of the patient
Last name	last name of the patient
Gender	gender of the patient
Telephone number	telephone number of the patient
Information	some general information of the patient
Date of birth	birth date of the patient
Street	streetname where patient lives
Housenumber	housenumber where patient lives
Zipcode	zipcode where the patient lives
City	city where the patient lives

4.5.4 New testresults since last communication

It must be possible to read the testresults of the patient that are tested after last successful communication. It must be possible to generate a picture of the waveform from the data in the Waveform field. Something like this:



Minimal set of information:

Patient-ID	automatically generated unique patient-ID
Date	date of testresult
Time	time of testresult
Earside	ear of testresult (left/right)
Result	result (pass/refer/aborted/error/…)
Waveform	the waveform of the measured OAE
Examiner	user that tested the patient
Location	selected testlocation from location list

4.5.5 New comments since last communication

It must be possible to read the comments about the patient that are typed in by the user after last successful communication.
Minimal set of information:

Patient-ID	patient-ID of the patient where the comment is about
Date	date of comment
Time	time of comment
Examiner	user that typed the comment

Location	selected testlocation from location list
Comment	comment from the examiner, selected from a predefined comment list or manually typed in

4.6 Command to close connection with the OAE device

This command closes the connection with the OAE device.
Executable name: disconnect.exe
Parameters: none
Example call: “disconnect”
Return value if successfully disconnected: “OK”
Return value if not disconnected: Error message