

7th Meeting of SE43

Biel/Bienne, 1-3 September 2010

Date issued: 30th August 2010

Source: Italy

Subject: Translation of the information provided to the geolocation database into elements of authorisation to the WSD

Summary

Whenever a WSD sends its request to a geolocation database from a given location, the database needs to provide the WSD itself with a list of available frequencies and the associated maximum allowed EIRP.

Although communications between the geolocation database and the WSD are expected to be in real time, the definition of site specific available resources (frequency and associated EIRP) is likely to require high volume of computations, especially in the Italian case, characterised by an extremely dense spectral occupation and a huge number of TV transmitting sites over the landscape. However, it has to be remarked that it is not necessary to perform calculations in real time, also because the TV broadcasting scenario is quite static. Therefore, the geolocation database can be filled with pre-elaborated data, which shall be periodically updated.

The most proper methodologies (e.g. algorithms and parameters and criteria) to be adopted in order to identify available resources for the WSD, whilst granting the most adequate level of protection to TV broadcasting, should be established by the Administrations, which intend to adopt the geolocation database approach to authorise WSDs. The update period of the geolocation database should also depend on the development of the TV broadcasting scenario, whose evolution is well known only by the National Administrations.

Proposal

It is proposed that in Section 9.3.5.2 of the Draft ECC Report it should be explicitly mentioned that the implementation of the translation process does not require real time computation capabilities inside the geolocation database.

Moreover it should also be mentioned that Administrations may have some degree of flexibility in deciding the most appropriate methodology (e.g. algorithms, parameter, criteria) to identify available resources for WSDs and guarantee the most adequate level of protection to TV broadcasting, according to the national conditions.

1. The translation process

A WSD which intends to operate in a specific location sends its information to the geolocation database and receives information on the available frequencies with associated values of maximum permitted EIRP.

In Section 9.3.5.2. of the Draft ECC Report an example algorithm of a translation process for the protection of DTT is shown, whose flowchart is recalled here below (see Figure 1). The segment of the flowchart between the two dashed red lines identifies the computation process inside the geolocation database. In particular, the list of technical information to be sent to the requesting WSD (available frequencies and associated maximum allowed EIRP) is determined after calculations that involve all the channels in the 470-790 MHz band, all the impacted BS transmitters and all the relevant BS receivers. Such an algorithm might need considerably long computation time, which is not acceptable as the WSD and the geolocation database have to exchange information in real time.

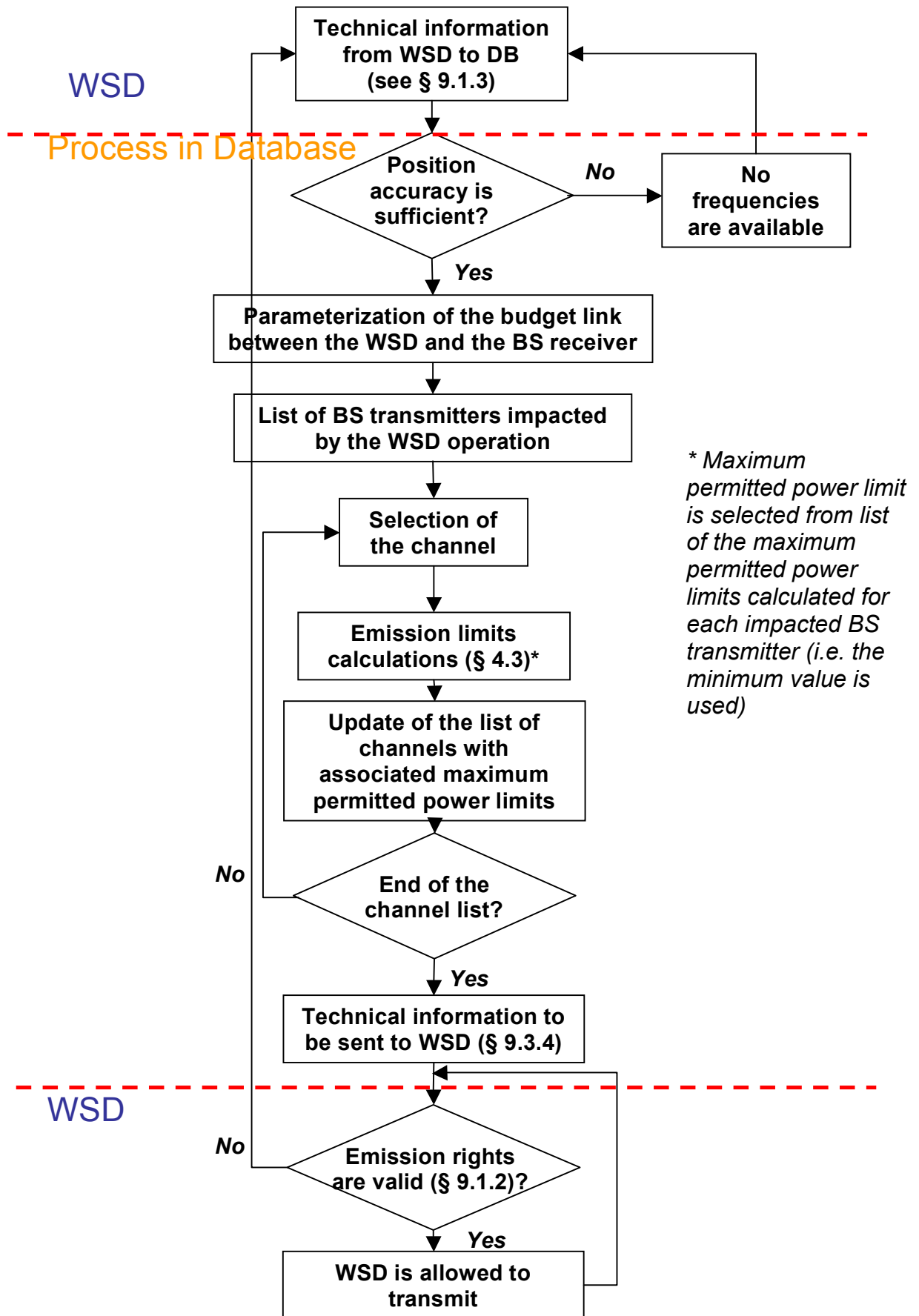


Figure 1. Example flowchart to determine available channels for WSD whilst protecting DTT (Section 9.3.5.2 of the Draft ECC Report)

In the Italian scenario of TV broadcasting, which is characterised by a dense occupation of spectral resources and a huge number of BS transmitters (nearly 25000) the computation of resources available for WSD in each pixel would require to take into account tens of DTT frequency channels actually used by BS transmitters, many BS transmitters (in some cases even hundreds) and a considerable number of potentially impacted BS receivers. Moreover the computation time strongly depends on the adopted prediction methodology and algorithms (e.g. propagation models), and on the possible optimization process for information update due to the development of the broadcasting scenario. In such a complex framework real time calculations does not represent a viable solution for the geolocation database.

In addition, it should be noted that besides the abrupt changes due to digital switch over, the TV broadcasting scenario is generally rather static, which means that the update of the information required to identify how spectral resources are employed over the territory can be limited by the Administration.

Therefore, it is evident that the translation process does not need to be implemented inside the geolocation database. The high volume of computations needed to determine available frequencies and associated maximum allowed EIRP can be performed with specific routines outside the database and results can be employed to populate the geolocation database itself. Once this information is available inside the database, data exchange between the database and the WSDs can be in real time.

Thus the flowchart in Figure 1 can be reshaped as shown in Figure 2, where its computation is left to routines outside the geolocation database.

The first step to determine the available resources is the analysis on how each DTT channel is employed over the territory. For each channel, all the BS transmitters operating in a specific channel must be taken into account to calculate in each pixel the received field strength level. In other words, propagation analysis represents the basis to determine resources potentially available for WSDs, according to specific criteria defined by the Administration to protect DTT against nuisance interference. Figure 3 shows an example of calculation of the employment of DTT channel 22 in the regional territory of Lazio, using the coverage reference levels of RPC1 provided by GE06. The assumed propagation model is ITU-R P.526.

According to the criteria defined for DTT protection, it is possible to identify those pixels where specific channels could be available for WSDs.

The determination of the maximum permitted EIRP represents the last step of the algorithm to fill the look-up table of the geolocation database and depends on several factors, such as the protection criteria and the WSD characteristics.

Previous steps are summarised in Figure 4.

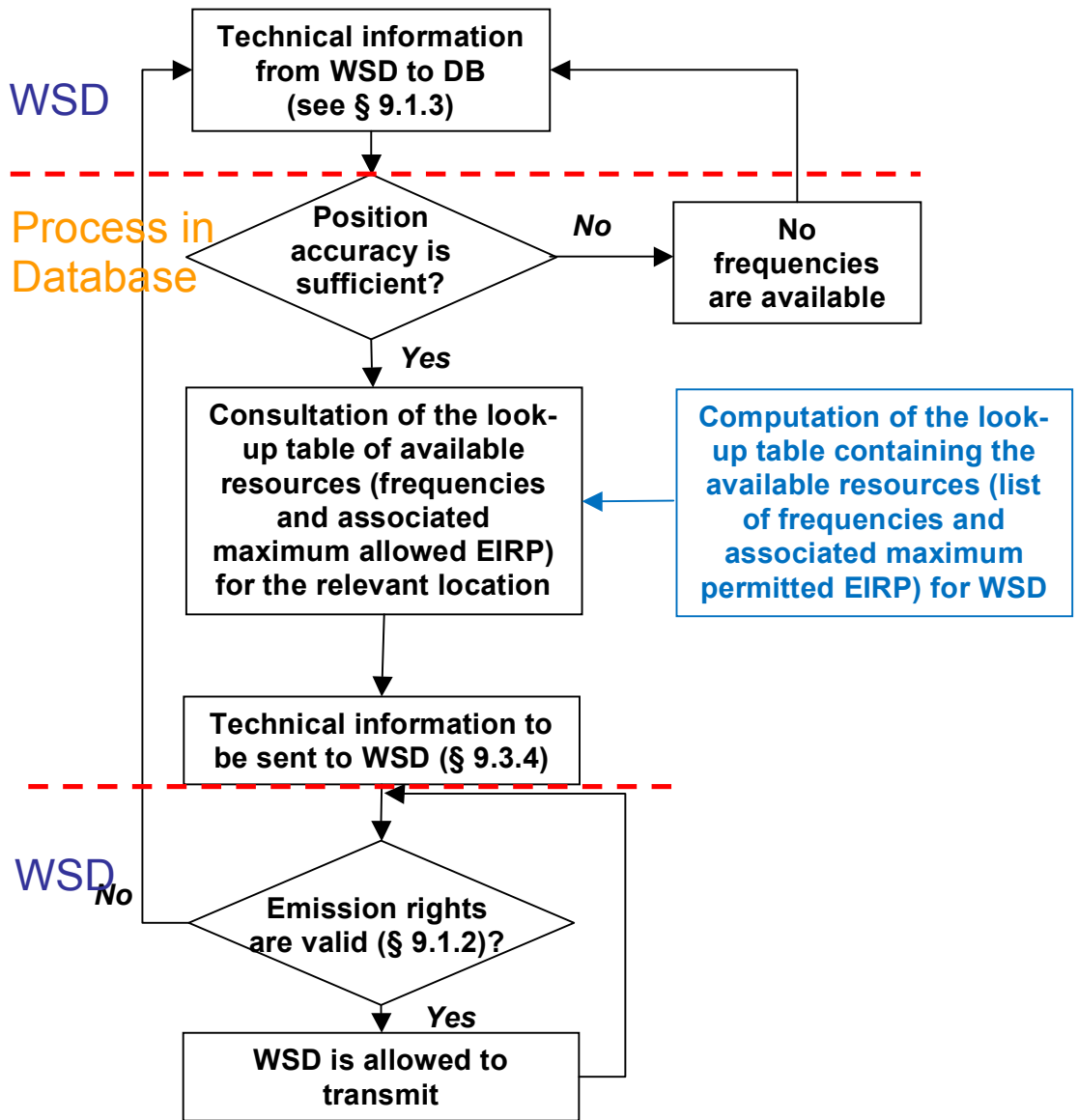


Figure 2. Example flowchart to determine available channels for WSD

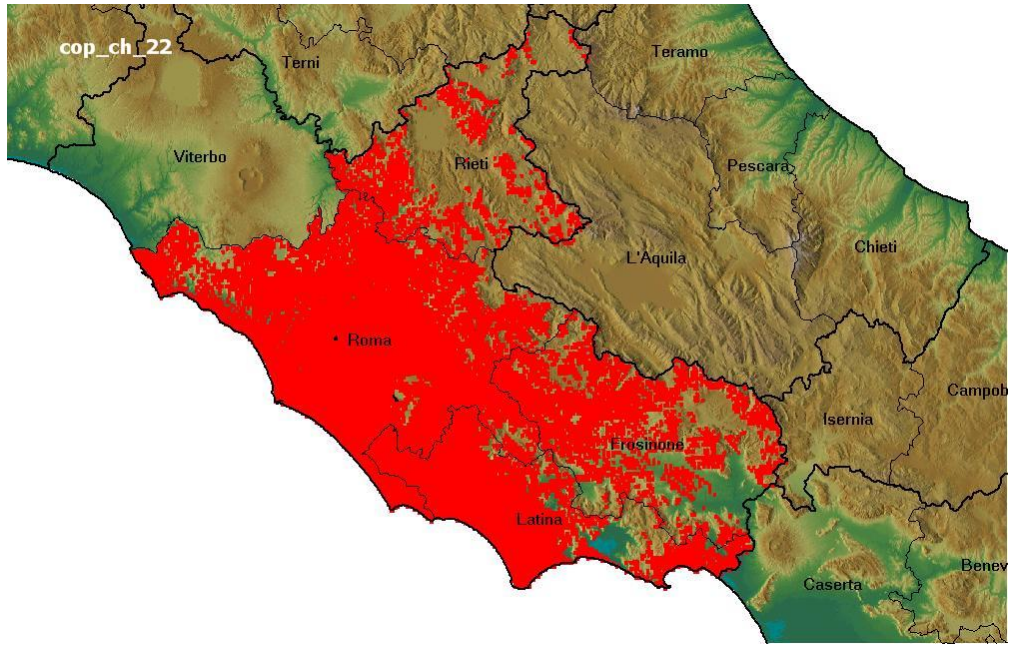


Figure 3. Employment of DTT channel 22 over the regional territory of Lazio

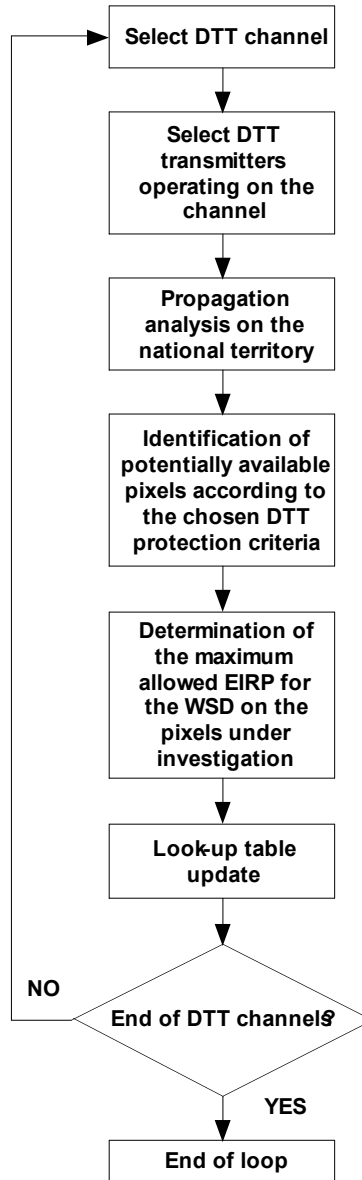


Figure 4. Example flowchart of the computation of the look-up table to fill the geolocation database