The previous discussion summarises the characteristics of a radio emission/reception sub-system in the typical case when the radio sub-system is only used by a single software defined radio application.

The invention is included in the case of radio equipment where several software defined radio applications simultaneously use a same radio emission/reception sub-system. For example, when a conventional radio communications application is executed simultaneously with a radio spectrum analysis application for radio sensing, or further in the case of telecommunications simultaneous with electronic scrambling.

Nevertheless, for the reason that the processing chain of the radio emission/reception sub-system can only operate at a given instant for the needs of a single software defined radio application, joint use of a same radio emission/reception sub-system by different software defined radio applications requires specific software interactions between the applications which use the same radio emission/reception sub-system so as to ensure synchronisation which avoids any access conflict between software defined radio applications and the radio emission/reception sub-system.

Such modifications in the software packages induce potentially burdensome couplings between software defined radio applications, with the associated impacts in terms of software development and integration, and difficulties in managing the configuration of the resulting software packages when the combinatorics of the potentially coupled applications increase.

The ~~motivation~~ embodiments of the invention ~~is~~ seek to find a remedy to the aforementioned drawbacks, by allowing a joint implementation of several software defined radio applications which access the same radio emission/reception sub-system without the applications depending on each other, avoiding costly software failovers.

~~For this purpose, the object of the invention is~~According to a first aspect of the present invention, there is provided a software defined radio emission/reception radio sub-system being part of ~~a piece of~~ software defined radio equipment, including a radio processing chain, achieving for emission the transformation of a digitised signal stemming from a software defined radio application into an electromagnetic signal capable of being conveyed by radio media and vice versa, for the reception, the transformation of an electromagnetic signal stemming from the radio media into a digitised signal capable of being processed by a software defined radio application, and a software control module capable of driving said radio processing chain while strictly observing primary control requests from a software defined ~~radio~~ application, also called primary software defined radio application.

The software defined radio emission/reception radio sub-system is characterised in that it is capable of processing secondary requests from at least one other software defined

radio application, also called secondary software defined radio application, independent of the primary software defined radio application, applying means for:

- receiving at least one secondary control request ~~from a~~ of a so called secondary software defined radio application,

- determining at least one primary inactivity period of said radio processing chain corresponding to the non-use of said radio processing chain according to the primary control request(s) emitted by the primary software defined radio application, and

- activating by means of an interface of said radio processing chain so as to satisfy, for a determined primary inactivity period, at least one secondary control request emitted by at least one secondary software defined radio application. wherein the software control module is further capable of determining, for a given determined primary inactivity period, whether the duration of the primary inactivity period is sufficient for completely satisfying a received secondary control request, and in that the means for activating said radio processing chain are only applied in the case of positive determination.

Advantageously, the software defined radio emission/reception radio sub-system may thus be used by software defined radio applications totally independent of each other, without any need for specific programming for ensuring a joint operation of these applications. The secondary software defined radio application may uses the radio emission/reception sub-system in an opportunistic way, without perturbing the operation of the primary software defined radio application, for periods of time when the radio sub-system is not used by the primary software defined radio application.

The presence or not of a secondary software defined radio application thus ~~does~~ may not by any way have an impact on the programming of the primary software defined radio application, and a secondary software defined radio application may be replaced with another one without any additional programming of the primary software defined radio application. Conversely, from the moment when the secondary software defined radio application is programmed so as to have an opportunistic secondary access, it does not need to be modified regardless of the primary software defined radio application actually used. Only intrinsic compatibility limits between the needs of use of the radio emission/reception sub-system by the primary software defined radio application and those of the secondary software defined radio application will limit the possibilities of proper operation of the secondary software defined radio application.

The radio emission/reception sub-system according to embodiments of the invention may also have one or more of the features below:

~~- the software control module is further able to determine, for a given determined primary inactivity period, whether the duration of the primary inactivity period is sufficient for completely satisfying a received secondary control request, and in that the means for activating said radio processing chain are only applied in the case of positive determination;~~

- a primary control request includes at least one piece of signal information relating to the signal to be emitted or to be received and at least one piece of time information relating to a time instant for beginning emission or reception;

- a secondary control request includes at least one piece of signal information relating to the signal to be emitted or to be received, but does not include any time information relating to a time instant for beginning emission or reception;

- said signal information comprises frequency information of the signal to be emitted or to be received and a piece of information on the number of digital signal samples to be emitted or to be received;

- it includes means for storing in memory a pending secondary control request;

- it includes means for receiving and storing in memory several secondary control requests each stemming from a different secondary software defined radio application, and in that the software control module includes means for selecting secondary control requests to be processed according to a predetermined order.

According to ~~another~~ a second aspect, ~~the object~~ of the present invention, there is provided a ~~is~~ software defined radio equipment comprising a software defined radio emission/reception radio sub-system as briefly described above, a primary software defined radio application and a secondary software defined radio application capable of ~~being interfaced~~ interfacing with the radio emission/reception sub-system, characterised in that the primary software defined radio application is a telecommunications application and in that the secondary software defined radio application is a ~~radio sensing~~ cognitive radio application.

Other features and advantages of the invention will become apparent from the description which is given thereof below, as an indication and by no means as a limitation, with reference to the appended figures wherein:

- fig. 1 is a schematic view of the portions of software defined radio equipment applied according to the invention;

- fig. 2 is an exemplary implementation of exchanges between a primary software defined radio application, a secondary software defined radio application and a radio emissions/reception sub-system according to the invention; and

- fig. 3 is a flowchart of the main steps of a software program able to implement the invention.

The invention deals with the simultaneous implementation of two software defined radio applications, typically a primary radio communications application which is treated with priority, and a secondary application.

The invention finds applications in the civilian field, the primary application being a telecommunications application, for example, according to the GSM standard, and the