

SPECIFICATION

A hot capacity extension POI device and method

FIELD OF THE INVENTION

5 [0001] The present invention relates to the field of POI (POINT OF INTERFACE) design, and more particularly to a hot capacity extension POI device and method.

BACKGROUD OF THE INVENTION

10 [0002] As a communication device, POI (multi-system access platform or multi-system integration platform) has emerged in the country for more than 15 years. The emergence of POI is the result of a concept of co-construction and sharing. POI belongs to a multi-system access. The main parameters are access frequency band, insertion loss, standing wave, isolation, power and intermodulation. Frequency band is
15 an indicator to measure POI access capability. Therefore, once the access frequency band or system changes, the original POI will not be used, and new equipment must be developed. POI is a multi-system combination device, and anti-interference ability is the core indicator. Isolation and intermodulation is representative of anti-interference ability. Similarly, any change of indicator will cause the original equipment to no longer
20 be used.

[0003] The mobile communication technology is rapidly updated, and the original services and frequency bands are gradually unable to adapt with the advancement of technology. Technology is changing every year, and the lifetime of passive system equipment is 200,000 hours significantly exceeding the technology
25 update period. Therefore, the continued service of the old equipment is the target of every builder, and it is a problem for the industry that has developed to today. Hot

capacity extension has become a real demand for many operators and builders. Especially long-term off-network will seriously affect the user experience and affect brand awareness. The so-called hot capacity extension refers to the expansion, transformation or upgrade without interruption of coverage.

5 [0004] In the prior art, even if there is a POI design, it cannot meet the current situation of more systems, more systems, and different expansion, and cannot guarantee the access capability of the full service. Due to the large number of services carried by a single drawer, the workload of transformation and upgrading is relatively large.

10 [0005] In summary, the traditional POI cannot solve the problem of hot capacity extension.

SUMMARY OF THE INVENTION

15 [0006] An object of the present invention is to provide a hot capacity extension POI device.

 [0007] Another object of the present invention is to provide a method of using a hot capacity extension POI device.

 [0008] In order to achieve the above objects, the present invention provides the following technical solutions.

20 [0009] A hot capacity extension POI device provided by the present invention is used for changing access of different frequency bands, and includes an expansion module and a base module. The expansion module is used for classifying access signals and the classified access signals forming mutually independent paths, and then integrating the paths. The base module is used for combining signals classified
25 and integrated by the expansion module and then performing frequency mixing output

on the signals.

[0010] Further, classifying the access signals refers to classifying the access signals according to a supportive communication frequency band signal type of the base module.

5 [0011] Further, integrating the paths refers to integrating independent and separate frequency bands belonging to the same supportive communication frequency band.

[0012] Further, the expansion module includes a plurality of expansion sub-modules for transmitting different supportive communication frequency bands and
10 the plurality of expansion sub-modules is independent of each other.

[0013] Further, each expansion sub-module includes a filter for accessing a same service signal.

[0014] Further, each expansion sub-module includes a combiner for combining different service signals.

15 [0015] Compared with the prior art, the solution of the present invention has the following advantages.

[0016] Compared with a conventional POI device, the present invention utilizes the characteristics of the base module inputting a respective supportive communication frequency band at a corresponding input port. Before accessing the
20 base module, each input port corresponding to the base module is provided with an expansion sub-module that at first filters or combines corresponding service signals.

[0017] When a new service signal needs to be accessed, it is only necessary to replace or adjust classification structure in a corresponding expansion sub-module of the new service signal, so as to prevent the signal transmission from affecting the user
25 due to the length of the off-network.

[0018] A method using the above-mentioned hot capacity extension POI device

provided by the present invention includes the following steps: classifying access signals and the classified access signals forming mutually independent paths, and then integrating the paths; combining signals classified and integrated by the expansion module; and performing frequency mixing output on the signals.

5 [0019] Further, classifying the access signals refers to classifying the access signals according to a supportive communication frequency band signal type of the base module.

[0020] Further, integrating the paths refers to integrating independent and separate frequency bands belonging to the same supportive communication
10 frequency band.

[0021] Further, forming mutually independent paths is to independently transmit the access signals after the same access signals are classified.

[0022] Further, when a new service signal needs to be accessed, transmission of a correspondingly accessed path is suspended; and filtration is performed to the
15 new service signal after the same new service signal is accessed.

[0023] Further, when a new service signal needs to be accessed, transmission of a correspondingly accessed path is suspended; and the new service signal and an original service signal are combined after the new service signal is accessed.

[0024] Compared with the prior art, the solution of the present invention has the
20 following advantages. Before a conventional POI device directly combines the access signals and performs frequency mixing output on the access signals, the access signals are classified and then integrated to make the access signals separable. When different classification signals need to access new service signals, it is only necessary to suspend the signal transmission of an access terminal corresponding to the new
25 service signal, and it does not affect the signal transmission of other access terminals, so as to avoid affecting the user experience due to off-network.

[0025] Additional aspects and advantages of the present invention will be set forth in part in the description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

5 [0026] The above and/or additional aspects and advantages of the present invention will become apparent and readily understood from the description of embodiments with reference to drawings.

[0027] Figure 1 is a physical diagram of a hot capacity extension POI device provided by the present invention; and

10 [0028] Figure 2 is a circuit schematic diagram of a hot capacity extension POI device provided by the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0029] The embodiments of the present invention are described in detail below,
15 and the examples of the embodiments are illustrated in the drawings, wherein the same or similar reference numerals are used to refer to the same or similar elements or elements having the same or similar functions. The embodiments described below with reference to the drawings are intended to be illustrative of the invention and are not to be construed as limiting.

20 [0030] A hot capacity extension device shown in figure 1 includes a base module 1 and an expansion module 2 to access mobile communication signals and output signals to an antenna feeding distribution system. The expansion module 2 forms respective mutually independent paths for transmission to the base module 1. Specifically, the expansion module 2 includes a plurality of expansion sub-modules,
25 and each of the expansion sub-modules forms a mutually independent path for

transmitting signals to the base module 1. One or more of the expansion sub-modules can be replaced without affecting the operation of other expansion sub-modules. When a service upgrade is required, only a corresponding expansion sub-module that accesses a new service signal is replaced, and the services of other expansion sub-modules are normal, and there is no need to change or stop running other expansion sub-modules. The base module 1 is capable of providing access from DC to 2.7 GHz (DC refers to signals of frequency as low as 0 Hz, and it is usually represented by DC in the telecommunication industry). It covers the main service frequency band of mobile communication access and is the basis for expansion, upgrade and transformation. It provides specific service access through the expansion sub-modules, and changes the corresponding access service that the expansion sub-modules can change. The flexibility of the expansion module 2 combined with the strong access capability of the base module 1 ensures the smooth implementation of the expansion and upgrade service.

[0031] Each of the expansion sub-modules of the expansion module 2 provides a mutually independent path, and when it is time for frequency band integration, carrier aggregation, and upgrade, it can be implemented on the corresponding expansion sub-module.

[0032] The signals that the hot capacity extension POI device accesses are from different operators and the frequency bands of the signals are different. The base module 1 classifies and accesses the supportive communication frequency band of the access signals. As shown in Table 1, each input port of the base module 1 is correspondingly input with a supportive communication frequency band. Therefore, each expansion sub-module corresponding to each input port of the base module 1 needs to set different supportive communication frequency band ranges for the access signal according to the classification of the supportive communication frequency

bands, so as to work as base for adjusting or replacing the corresponding expansion sub-module.

[0033] The access system and frequency band that the base module 1 of the hot capacity extension POI device can provide are as shown in Table 1.

Base module frequency band (MHz)	Supportive communication frequency band (MHz)	Supportive business standards (MHz)
DC-960	B5、B6、B8、B12~20 B26~28、B31、B44	Cluster, public security fire, LTE, GSM, CDMA, UMTS
1710-1880	B3	PCM、DCS、LTE、GSM
1920-2170	B1、B23、B34、B65	WCDMA、TD-SCDMA、CDMA、LTE
2300-2700	B7、B30、B38、B40、B41	LTE、TD-SCDMA

5 [0034] Based on different supportive communication frequency bands, there are corresponding frequency bands and different system. This way, each expansion sub-module classifies the access signals and then integrates the independent and separate frequency bands (even different types of access signals) belonging to a same supportive communication frequency band for carrier aggregation. At the same
10 time, the carrier aggregation needs to be equal to or higher than 5MHz for the independent and separate frequency bands, and the best case is greater than 10MHz.

[0035] Therefore, carrier aggregation involves at first integrating the separate frequency bands of the same supportive communication frequency band to form an interconnected frequency band greater than 5 MHz, and performing carrier
15 aggregation with the frequency bands of other service signals belonging to the same supportive communication frequency band. In this embodiment, the expansion module is divided into four groups; each group has four expansion sub-modules, so there are 4*4 expansion sub-modules (201-216), as shown in figure 2. Each expansion sub-module is an independent path. When the above-mentioned carrier aggregation

occurs, the case of accessing a first expansion sub-module 201 is taken as an example. The access capability has changed, and new service is to be accessed. The expansion sub-module 201 needs to be adjusted or replaced with a corresponding transmission mechanism to support the new requirements. The details are as follows.

5 [0036] When an original service signal needs to be replaced with a new service signal, the signal transmission of the expansion sub-module corresponding to the new service signal is suspended, and for the expansion sub-module, the filter corresponding to the original service signal is replaced with a filter corresponding to the new service signal. In an embodiment, for the first expansion module 201, the
10 original service signal is GSM900, and due to service upgrade, a service signal of the LTE 700 needs to be replaced. At this time, as shown in figure 1, the first expansion sub-module 201 is extracted, thereby replacing its internal GSM filter with an LTE filter.

 [0037] When a new service signal needs to be accessed, the signal transmission of the expansion sub-module corresponding to the new service signal is
15 suspended, and the expansion sub-module is replaced with a combiner which combines the new service signal with the original service signal accessed through the expansion sub-module. The original service signal and the new service signal belong to the same supportive communication frequency band. In another embodiment, the original access signal of the first expansion module 201 is a service signal of GSM900,
20 and the service signal of LTE 700 needs to be added due to service upgrade. At this time, the first expansion sub-module 201 is extracted. As shown in Figure 1, the internal GSM filter is replaced with a combiner that can access signals of 700MHz and 900MHz.

 [0038] In the above two processes of replacing the corresponding transmission
25 mechanisms of the first expansion sub-module 201, the second to sixteenth expansion sub-modules (202-216) are still operating normally, and are not affected by

the internal variation of the first expansion sub-module 201.

[0039] The base module 1 is composed of four combiners 102, each of which can provide access to four communication frequency bands as shown in Table 1. The base module 1 can provide 4*4 supportive communication frequency band access, and up to 4 sets of the same supportive communication frequency band can be connected to the 4 combiners of the base module 1. A bridge 101 is a 4-in and 4-out bridge integrated with a coupler 103, which can also be composed of four bridges as shown in figure 2, thereby providing a 4-in and 4-out splitting and combining function. It functions to mix 16 paths of signals and then introduce them into an antenna feeding distribution system, and feed the received antenna feed signals back to a source.

[0040] The present invention provides a method using the above-mentioned hot capacity extension POI device. When a new service signal needs to be accessed, an access path corresponding to the new service signal is suspended, and when the new service signal is accessed, the transmission of the corresponding access path can be resumed. Accordingly, it is unnecessary to stop the transmission of all access paths, and to resume all transmissions after the new service signal is accessed.

[0041] The solution of the method is to classify the access signals first, and the signals of each class are independent paths, and do not interfere with each other. One or more of the paths can be replaced without affecting the operation of other paths. Then, the classified signals are integrated to form independent integrated signals, and finally, the integrated signals are combined and mixed in frequency and outputted to the antenna feeding distribution system. The technical effect of the technical solution is that even if the access signal needs to add a new service signal, it will not affect the transmission of other service signals.

[0042] According to the supportive communication frequency band category of the base module 1, the access signals are divided into transmission paths having

different supportive communication frequency bands before being accessed to the base module 1. Transmission paths are independent of each other without interfering with each other. Then, the classified signals belonging to a same supportive communication frequency band are integrated. According to Table 1, even signals of a same supportive communication frequency band can come from the corresponding frequency band and different service systems, that is, it may come from different operators or public institutions. Therefore, the same supportive communication frequency bands include independent and separate frequency bands. Before the base module 1 combines them, it is necessary to integrate these independent and separate frequency bands of the same supportive communication frequency band for carrier aggregation. Then combining and frequency mixing is performed to them by the base module 1. Here, the independent and separate frequency bands for carrier aggregation need to be equal to or higher than 5 MHz, and the best case is greater than 10 MHz.

[0043] Therefore, carrier aggregation involves at first integrating the separate frequency bands of the same supportive communication frequency band to form an interconnected frequency band greater than 5 MHz, and performing carrier aggregation with the frequency bands of other service signals belonging to the same supportive communication frequency band. According to the above-mentioned hot capacity extension POI device, when a new service signal needs to be accessed, it is adaptively adjusted or replaced with a transmission of a new service signal. The details are as follows.

[0044] When it is necessary to replace an original service signal with a new service signal, the transmission of the path accessed by the new service signal is suspended. After accessing the new service signal, the new service signal is filtered instead of filtering the original service signal. In an embodiment, the original service

signal is GSM900, and the service signal needs to be replaced with the service signal of the LTE700. In this case, the access mode of the service signal is to filter the service signal of the LTE700 and then transmit the same.

[0045] When a new service signal needs to be accessed, the transmission of the path accessed by the new service signal is suspended. After accessing the new service signal, the newly added service signal is combined with the original service signal of the path, and the original service signal and the new service signal belong to the same supportive communication frequency band. In an embodiment, the original service signal is GSM900, and the service signal of the LTE700 needs to be added due to the service upgrade. At this time, the two service signals are combined and transmitted.

[0046] In the above two processes for adjusting the access path of new service signals, the operation of other paths is not affected.

[0047] After classification, integration and independent transmission of the access signals according to different frequency bands, the base module 1 needs to combine and frequency mix the different independent paths and finally, output the same to the antenna feeding distribution system. The base module 1 accesses different paths, combines them to form a multi-path combination signal, frequency mixes them, and then outputs the signal to the antenna feeding distribution system, and feeds back the received antenna feeding signal back to a signal source. In this embodiment, corresponding to the expansion module 2, the base module 1 has four combiner circuits, and each combiner circuit has four combiner inputs, that is, the base module 1 can provide a 4*4 supportive communication frequency band access.

[0048] The hot capacity extension POI device and method provided by the present invention employ characteristics of each input port of the base module 1 is able to input different supportive communication frequency band, and before

accessing the base module 1, the service signals are filtered or combined for classification, so that the classified signals form independent transmission paths, achieving the technical effect of suspension of transmission of one or more paths without affecting other path transmission. In this way, when a new service signal
5 needs to be accessed, it is only necessary to suspend the signal transmission of the access path of the new service signal, without stopping the transmission of all the paths, so as to avoid serious impact on the user due to long-time off-network.

[0049] The above is only a part of the embodiments of the present invention, and it should be noted that those skilled in the art can also make several
10 improvements without departing from the principles of the present invention. It should be considered as the scope of protection of the present invention.

CLAIMS

1. A hot capacity extension POI device for changing access of different frequency bands, comprising an expansion module and a base module,

5 the expansion module being used for classifying access signals and the classified access signals forming mutually independent paths, and then integrating the paths; and

 the base module being used for combining signals classified and integrated by the expansion module and then performing frequency mixing output on the signals,
10 each input port of the base module being correspondingly input with a supportive communication frequency band, wherein classifying the access signals refers to classifying the access signals according to a supportive communication frequency band signal type of the base module; and integrating the paths refers to integrating independent and separate frequency bands belonging to the same supportive
15 communication frequency band.

2. The hot capacity extension POI device as recited in claim 1, wherein the expansion module includes a plurality of expansion sub-modules for transmitting different supportive communication frequency bands and the plurality of expansion
20 sub-modules are independent of each other.

3. The hot capacity extension POI device as recited in claim 2, wherein each expansion sub-module includes a filter for accessing a same service signal.

25 4. The hot capacity extension POI device as recited in claim 2, wherein each expansion sub-module includes a combiner for combining different service signals.

5. A hot capacity extension POI method using a hot capacity extension POI device as recited in any one of claims 1 to 4, comprising the following steps:

classifying access signals and the classified access signals forming mutually

5 independent paths, and then integrating the paths;

combining signals classified and integrated by the expansion module; and

performing frequency mixing output on the signals; wherein classifying the access signals refers to classifying the access signals according to a supportive communication frequency band signal type of the base module; and integrating the

10 paths refers to integrating independent and separate frequency bands belonging to the same supportive communication frequency band.

6. The hot capacity extension POI method as recited in claim 5, wherein forming mutually independent paths is to independently transmit the access signals after the

15 same access signals are classified.

7. The hot capacity extension POI method as recited in claim 6, wherein when a new service signal needs to be accessed, transmission of a correspondingly accessed path is suspended; and filtration is performed to the new service signal

20 after the same new service signal is accessed.

8. The hot capacity extension POI method as recited in claim 6, wherein when a new service signal needs to be accessed, transmission of a correspondingly accessed path is suspended; and the new service signal and an original service

25 signal are combined after the new service signal is accessed.

ABSTRACT

A hot capacity extension POI device and method

5 A hot capacity extension POI device and method are provided. The hot capacity extension POI device comprises an expansion module and a base module. The expansion module is used to classify access signals according to a supportive communication frequency band signal type of the base module and then integrate the signals belonging to the same supportive communication frequency band. The

10 base module is used to combine signals classified and integrated by the expansion module and then to perform frequency mixing output on the signals. Before the base module is accessed, the expansion module is firstly used to filter or combine various service signals for classification. Hence, when new service signals are to be accessed, only signal transmission at an access terminal corresponding to the new

15 service signals needs to be suspended without stopping the transmission of all access signals, so as to prevent being off-line for a long time, thereby seriously affecting use by a user.