

Method for dynamic channel allocation in radio systems, especially for wireless local loop (WLL) systems, and devices for carrying out the method

Description

5 The invention relates to a method for dynamic channel allocation in radio systems, especially for wireless local loop (WLL) systems, and devices for carrying out the method.

10 Radio systems have become much more significant in communications and data technology, especially since the Federal Post Office have lost their telecommunications monopoly. The reason for this is that private providers do not have access to a line plant network to the individual households. The creation of such a line
15 plant network, however, would require considerable investment costs so that the private providers would not be competitive. The data are therefore transmitted from a base station to the user unit by means of radio. Such wireless local loop (WLL) systems allow centralized
20 supply to households without corresponding creation of extensively branching line plant.

 In radio systems, dynamic channel allocation is required for adaptation to changing transmission rates since the number of available channels is greatly
25 limited. The data produced must therefore be distributed over the individual channels so that the available channels are utilized optimally. At the same time, the radio system must be able to respond flexibly to changes in the transmission rates. The cause for changing transmission rates can be the data service itself or the
30 setting-up and clearing-down of simultaneous connections with constant data rate such as, for example, voice transmissions.

 In the known radio systems which transmit in
35 parallel in a plurality of channels between transmitter and receiver, the data produced are mapped into the allocated channels in accordance with a certain

algorithm. The disadvantage of the known radio systems is the lack of synchronization of the activation or deactivation of channels in transmitter and receiver so that a changed channel allocation does not become effective simultaneously in the transmitter and receiver. The consequence of the lack of synchronization is that the mapping algorithm is disturbed so that data errors occur during the transmission. If, for example, the mapping algorithm allocates additional channel capacity too early to the receiver, this can lead to reception of pseudo data. If this additional channel capacity is included too late in the mapping algorithm, in contrast, this will lead to data losses. The reverse applies in the case of a reduction of channel capacities, i.e. too early a reduction leads to data losses and too late a reduction can lead to the occurrence of pseudo data. In bidirectional transmission, each transmitter at the same time acts as a receiver so that the abovementioned errors can occur at each transmission end.

The invention is therefore based on the technical problem of creating a method for dynamic channel allocation in radio systems, and devices for carrying out the method, in which the changed channel allocation becomes effective simultaneously for transmitter and receiver.

The solution of the problem is found in the features of patent claims 1, 8 and 11. By establishing that an involved station is the master which derives new channel and link tables from the data transfer load and transfers these to master and slave, the system is placed into a state of expectation, and in the case of a duplex radio transmission link, the master can be defined independently of the initiating station. The final reconfiguration is executed by sending out a reconfiguration signal from the master to the slave and by acknowledgment of the reception by the slave, the reconfiguration and acknowledgment signals being ignored in each case by the mapping algorithm. At the same time, the reconfiguration signal and the acknowledgment signal overlap in time with the allocation or withdrawal proce-

dures for the channels on the side of the master (2) and of the slave (3), which avoids data losses or the injection of pseudo data.

5 Other advantageous developments of the invention are obtained from the subclaims. In a further embodiment, there exists exactly one virtual connection module for each active slave in the mapping module of the master and also exactly one virtual connection module in the mapping module of the slave. The additional method step of
10 checking whether the demanded channels are available or the connection capacity is adequate ensures that no physically impossible configuration is set at the master or the slaves. When a plurality of channels are allocated or withdrawn, the same methods can be carried out in
15 parallel. When expected signals are not received, the master or the slave can return to the initial state after a presettable number of cycles or time, which prevents the system from being in an unstable state over a prolonged period of time.

20 In another embodiment and with the instruction for reducing the channel capacity, the channel to be deactivated is taken out of the mapping algorithm at the master end in the direction of transmission whilst it remains tied in in the receiving direction. At the end of
25 the slave, the relevant channel remains tied into the mapping algorithm. The master can then send the reconfiguration signal to the slave via the channel to be deactivated. After the reconfiguration signal has been received, the slave sends an acknowledgment signal to the
30 master and unties the channel from the mapping algorithm at the transmitting and receiving end. After receiving the acknowledgment signal, the master then also unties the channel from the mapping algorithm at the receiving end.

35 In the case of an allocation of channel capacity, the newly allocated channel is activated in the transmitting and receiving direction on the side of the master without being considered by the mapping algorithm, however. On the side of the slave, the channel to be

newly set up is blocked in the transmitting direction and activated in the receiving direction without being taken into consideration by the mapping algorithm. The master can then send a reconfiguration signal to the slave on
5 the channel. After receiving the reconfiguration signal, the slave sends an acknowledgment signal to the master via the newly allocated channel, and in the receiving direction the channel is taken into consideration by the mapping algorithm on the side of the slave. After the
10 acknowledgment signal has been received by the master, the newly set up channel can then be tied into the mapping algorithm of the master at the transmitting and receiving end and the transmission of useful data can be begun. After receiving the first useful data, the newly
15 allocated channel is also tied into the mapping algorithm at the transmitting end by the slave.

To carry out the method, a base station acting as master with a bidirectional interface which is connected to the telecommunication network and which is connected
20 to a mapping module is used, for example. On the radio side, the mapping module is connected to an RF module via a data bus, the mapping module being driven by a protocol controller connected to the bidirectional interface. In another embodiment, the mapping module is formed by a
25 multiplexer on the network side and by virtual connection modules on the radio side. The user unit acting as slave comprises a mapping module which is connected to an RF module arranged at the input of the user unit on the radio side. On the user side, the mapping module is
30 connected to the respective terminals of the users. In another embodiment, the mapping module can be formed by a virtual connection module on the radio side and by a multiplexer on the user side.

In the text which follows, the invention will be
35 explained in greater detail with reference to a preferred exemplary embodiment. The figures show in:

Fig. 1, a block diagram of the radio system,

Fig. 2, a layer model of the radio system,

Fig. 3, a state machine for a base station in the case

of the allocation of channels,
Fig. 4, a state machine for a user unit in the case of
the allocation of channels,
Fig. 5, a state machine for the base station in the
case of a reduction in channels, and
Fig. 6, a state machine for a user unit in the case of
a reduction in channels.

The radio system 1 comprises a base station 2 and
a plurality of independent user units 3. The base station
2 comprises a bidirectional interface 4 connected to the
telecommunication network, a protocol controller 5, a
mapping module 6, a data bus 7 and a radio-frequency (RF)
module 8 with an air interface 9. The mapping module 6
comprises a multiplexer 10 and a multiplicity of virtual
connection modules 11. The user units 3 comprise a radio-
frequency (RF) module 12 and a mapping module 13. Like
the mapping module 6 of the base station 2, the mapping
module 13 of the user unit 3 comprises a multiplexer 14
and a virtual connection module 15. At the user end, the
multiplexer 14 is connected to subscriber interface
circuits 16 of connected terminals. The protocol control-
ler 5 is connected bidirectionally to the bidirectional
interface 4. Furthermore, a signal output of the protocol
controller 5 is connected to the control inputs of the
multiplexer 10 and of the virtual connection module 11.
The RF module 8 is connected on the radio side to the
virtual connection modules 11 of the mapping module 6 via
the data bus 7. The RF module 12, equipped with an air
interface 17, of the user unit 3 is connected to the
virtual connection module 15 of the mapping module 13.

In the radio system 1 shown, the base station 2
is the higher hierarchy level in relation to the user
units 3 and therefore assumes the function of the master.
The data, arriving, for example, from the telecommunica-
tion network, are present at the data inputs of the
multiplexer 10 of the mapping module 6 via the
bidirectional interface 4. The protocol controller 5
derives appropriate control signals for the multiplexer
10 and the virtual connection modules 11 of the mapping

modules 6 from the data. The multiplexer 10 allocates the data streams for a respective active user unit 3 to one of the virtual connection modules 11 without specifically identifying the individual connections of the user unit.

5 Such a connection module 11 is generated and continues in existence for as long as the user unit 3 is active. The virtual connection module 11 correlates with the respective virtual connection module 15 of the mapping module 13 of the user unit 3. In this process, the data are forwarded by the virtual connection module 11 to the RF module 8 via the data bus 7 and transmitted to the air interface 17 of the RF module 12 of the respective user unit 3 via the air interface 9. The RF module 12 forwards the received data to the virtual connection module 15.

10 The data are then present at the input of the multiplexer 14 from where they are multiplexed to the respective active terminals of the users by the multiplexer 14.

The requirement for dynamic channel allocation is triggered by the protocol controller 5. The control signal of the protocol controller 5 triggers the multiplexer 10 and the virtual connection modules 11. This controlling involves the transfer of an updated link table for the multiplexer 10. The link table contains the active user links which must be allocated to a certain virtual connection module 11. The controlling also involves the transfer of an updated channel table for the virtual connection modules 11. The channel table contains the channels which must be utilized for transmitting the data. Furthermore, the protocol controller 5 controls the virtual connection module 15 and the multiplexer 14 in the user unit 3 for the purpose of dynamic channel allocation. This controlling involves the transfer of an updated channel table which corresponds to the channel table of the virtual connection module 11 of the base station 2 for the virtual connection module 15. The multiplexer 14 is controlled by transfer of an updated user link table which contains the information regarding which link is to be allocated to which of the subscriber interface circuits 16. In the case of an active user unit

3, the control is transferred to the user unit 3 via the channel or channels already set up. If there are no established channels as yet, the instruction for generating a virtual connection module 15 and a shortened channel table containing only one channel is transmitted to the user unit 3 via a control channel. In accordance with the procedure for the dynamic channel allocation which will be explained in greater detail in the text which follows, all control instructions are transmitted, and, if necessary, other channel allocations are also carried out, via this channel. The virtual connection modules 11, 15 utilize the provided channels as total capacity which is not split in a user-related manner. For this purpose, a mapping algorithm exists according to which the data arriving serially from the multiplexers 10, 14 are mapped into the channels without reference to user subscriptions or, respectively, according to which the mapping must be cancelled and a serial data stream must be generated again in the opposite direction to the multiplexers 10, 14.

Figure 2 shows the radio system 1 as a layer model. The protocol controller 5 of base station 2 is an entity of layer 3 and derives the necessity for changing transmission capacities from signalling for the setting-up and clearing-down of connections. As a result, the instructions for dynamic channel allocation to the virtual connection modules 11 of the base station 2 and the virtual connection modules 15 of user units 3 are derived. The virtual connection modules 11, 15 implement layer-2 and partly layer-1 tasks.

In the text which follows, the process of dynamic channel allocation is described in detail with reference to state machines which are a component of the virtual connection modules 11, 15.

Fig. 3 shows the state machine 20 for a virtual connection model 11 of base station 2 for the case of an allocation of channel capacity. The static mode 21 involves the utilization of $0 \leq n \leq n_{\max}$ channels between base station 2 as master and user unit 3 as slave. In the

case where $n > 0$, the data are transmitted via the allocated and established channels in accordance with the mapping algorithm. In this case, n can assume values of between fractions of a channel up to $n_{\max} \gg 1$. Following
5 the instruction for increasing the channel capacity 22 which is contained in the channel table transferred by the protocol controller 5, the transition to the state Testing the instruction 23 takes place. The instructed increase in channel capacity 22 can assume values of $m_{\min}$
10 $\leq m \leq 1$. If the requested increase in channel capacity 22 is greater than 1 channel, a plurality of state machines 20 become active in parallel. A negative test result 24 leads back to the static mode 21 with the starting parameters if the allocated channel is not available or
15 the capacity of the virtual connection module 11 would be exceeded. In these cases, an alarm indication signal is sent to the protocol controller 5. If the test result is positive 25, the transition to the state Phase 1 of the dynamic channel allocation 26 takes place. The state
20 Phase 1 of the dynamic channel allocation 26 involves that transmitting and receiving is activated in the newly allocated channel but the channel is not yet utilized jointly with already established channels in accordance with the mapping algorithm. In the transmitting direc-
25 tion, an allocation information item (Info 1) acting as reconfiguration signal is sent out to user unit 3 in the channel to be set up. In the direction of reception, an acknowledgment for the allocation information item (Info 1) is expected. The state Reception without acknowledg-
30 ment 27 again leads to the state Phase 1 of the dynamic channel allocation 26 and to a retransmission of an allocation information item (Info 1). A transition 28 to static mode 21 with the starting parameters can take place if no acknowledgment has arrived for a presettable
35 number of cycles or a presettable time or a received acknowledgment is invalid. In these cases, an alarm indication signal is sent to the protocol controller 5. The arrival of an acknowledgment 29 leads to the state Phase 2 of the dynamic channel allocation 30. The state

Phase 2 of the dynamic channel allocation 30 involves that the newly allocated channel is used jointly with the already established channels in accordance with the mapping algorithm. In the transmitting direction, the transmission of useful data is begun. In the direction of reception, the failure of the acknowledgment to appear is expected. Reception with acknowledgements 31 again leads to state of Phase 2 of the dynamic channel allocation 30. The acknowledgments are ignored by the mapping algorithm. When the acknowledgments 32 fail to appear, transition to static mode 21 with the new parameters takes place.

Fig. 4 shows the state machine 40 for the virtual connection module 15 of the user unit 3 for the case of the allocation of channel capacity. The static mode 41 state involves utilization of $0 \leq n \leq n_{\max}$ channels between the base station 2 as master and the user unit 3 as slave. In the case where $n > 0$, data are transferred via the allocated and established channels in accordance with the mapping algorithm. In this process n can assume values of between fractions of a channel up to $n_{\max} \gg 1$. With the instruction for increasing the channel capacity 42 which is contained in the channel table transferred by the protocol controller 5, the transition to the state Testing the instruction 43 takes place. The instructed increase in channel capacity 42 can assume values of from $m_{\min} \leq m \leq 1$. If the demanded increase in channel capacity 42 is greater than 1 channel, a plurality of state machines 40 become active in parallel. A negative result of the test 44, if the maximum transmission capacity of the user unit 3 would be exceeded, again leads to static mode 41 with the starting parameters. In this case, an alarm indication signal is sent to the protocol controller 5. In the case of a positive result of the test 45, a transition to the state Phase 1 of the dynamic channel allocation 46 occurs. The state Phase 1 of the dynamic channel allocation 46 involves that the channel to be set up is blocked in the transmitting direction and receiving is activated and an allocation information item (Info 1) is expected. The channel is not yet being used

jointly with already established channels in accordance with the mapping algorithm. Reception without an allocation information item 47 (Info 1) again leads to the state of Phase 1 of the dynamic channel allocation 46. A transition 48 to static mode 41 with the starting parameters can take place if no allocation information item (Info 1) has arrived for a presettable number of cycles or a presettable time or a received allocation information item is invalid. In these cases, an alarm indication signal is sent to the protocol controller 5. The arrival of an allocation information item 49 leads to the state of Phase 2 of the dynamic channel allocation 50. The state of Phase 2 of the dynamic channel allocation 50 involves that an acknowledgment is sent to base station 2 and the receiving direction is utilized jointly with already established channels in accordance with the mapping algorithm. The reception of further allocation information items 51 again leads to the state of Phase 2 of the dynamic channel allocation 50 and a retransmission of an acknowledgement. The allocation information items are ignored by the mapping algorithm. The failure of a further allocation information item 52 to appear leads to the static mode 41 with the new operating parameters. This ensures that, in the case of the allocation of channels, pseudo data are not included in the mapping in a receiver before the beginning of a transmission of useful data and the beginning of the transmission of useful data is included in a defined manner in the mapping without loss of data.

Fig. 5 shows the state machine 60 for a virtual connection module 11 of the base station 2 for the case of a withdrawal of channel capacity. Static mode 61 involves the utilization of $n_{\min} \leq n \leq n_{\max}$ channels between base station 2 and the user unit 3. The data are transmitted via the allocated and established channels in accordance with the mapping algorithm. With the instruction for withdrawing channel capacity 62 which is contained in the channel table transferred by the protocol controller 5, the transition to the state Testing the

instruction 63 takes place. If the required reduction in channel capacity is greater than 1 channel, a plurality of state machines 60 will act in parallel. A negative result of the test 64, if this is justified by plausibility checks not directly relevant for the method, again leads to static mode 61 with the starting parameters. In this case, an alarm indication signal is sent to the protocol controller 5. A positive result of the test 65 leads to the state of Phase 1 of the dynamic channel allocation 66. The state of Phase 1 of the dynamic channel allocation 66 involves that the transmitting direction is no longer used in accordance with the mapping algorithm in the channel to be deactivated. In the transmitting direction, a withdrawal information item (Info 2) is sent in the channel to be deactivated. In the receiving direction, the channel remains tied into the mapping algorithm. An acknowledgment for the withdrawal information item is expected and is ignored by the mapping algorithm. Reception without acknowledgment 67 again leads to the state of Phase 1 of the dynamic channel allocation 66. A withdrawal information item is again transmitted. A transition 68 to static mode 61 with the starting parameters can take place if no acknowledgment has arrived for a presettable number of cycles or a presettable time or a received acknowledgment is invalid. In these cases, an alarm indication signal is sent to the protocol controller 5. The arrival of an acknowledgment 69 leads to the state of Phase 2 of the dynamic channel allocation 70. The state of Phase 2 of the dynamic channel allocation 70 involves that the channel to be deactivated is deactivated at the transmitting end. Further reception of acknowledgment 71 again leads to the state of Phase 2 of the dynamic channel allocation 70. Incoming acknowledgements are ignored by the mapping algorithm. The failure of acknowledgments 72 to appear leads to the static mode 61 with the new parameters.

Fig. 6 shows the state machine 80 for a virtual connection module 15 of user unit 3 for the case of a reduction in channel capacity. Static mode 81 involves

the utilization of $n_{\min} \leq n \leq n_{\max}$ channels between base station 2 and user unit 3. The data are transmitted via the allocated and established channels in accordance with the mapping algorithm. With the instruction for reducing the channel capacity 82 which is contained in the channel table transferred by the protocol controller 5, the transition to the state Testing the instruction 83 takes place. The instructed reduction in channel capacity can assume values of from $m_{\min} \leq m \leq 1$. If the required reduction in channel capacity is greater than 1 channel, a plurality of state machines 80 will act in parallel. A negative result of the test 84, if this is justified by plausibility checks not directly relevant for the method, leads to the static mode 81 with the starting parameters. In this case, an alarm indication signal is sent to the protocol controller 5. A positive test result 85 leads to the state of Phase 1 of the dynamic channel allocation 86. The state of Phase 1 of the dynamic channel allocation 86 involves that a withdrawal information item (Info 2) is expected in the channel to be deactivated. The channel is still being used jointly with the already established channels in accordance with the mapping algorithm. Reception without a withdrawal information item 87 (Info 2) again leads to the state of Phase 1 of the dynamic channel allocation 86. A transition 88 to static mode 81 with the starting parameters can take place if no withdrawal information item has arrived for a presetable number of cycles or a presetable time or a received withdrawal information item is invalid. In these cases, an alarm indication signal is sent to the protocol controller 5. The arrival of a withdrawal information item 89 leads to the state of Phase 2 of the dynamic channel allocation 90. The state of Phase 2 of the dynamic channel allocation 90 involves that an acknowledgement is sent to the base station 2. The reception of further withdrawal information items 91 again leads to the state of Phase 2 of the dynamic channel allocation 90 and an acknowledgement is sent again. The withdrawal information items are ignored by

the mapping algorithm. The failure of the withdrawal information item 92 to appear leads to the static mode 81 with the new parameters. This ensures that when channels are withdrawn, the end of the transmission of useful data is included in a defined manner in the mapping without loss of this data and pseudo data are not included in the mapping after the end of a transmission of useful data in a receiver.

List of reference designations

	1	Radio system
	2	Base station, master
	3	User unit, slave
5	4	Bidirectional interface
	5	Protocol controller
	6	Mapping module
	7	Data bus
	8	Radio-frequency module
10	9	Air interface
	10	Multiplexer
	11	Virtual connection module
	12	Radio frequency module
	13	Mapping module
15	14	Multiplexer
	15	Virtual connection module
	16	User interface circuit
	17	Air interface
	20	State machine
20	21	Static mode
	22	Increase in channel capacity
	23	Testing the instruction
	24	Negative result of the test
	25	Positive result of the test
25	26	Phase 1 of the dynamic channel allocation
	27	Reception without acknowledgment
	28	Transition
	29	Arrival of an acknowledgment
	30	Phase 2 of the dynamic channel allocation
30	31	Reception with acknowledgment
	32	Failure of the acknowledgment to appear
	40	State machine
	41	Static mode
	42	Increase in channel capacity
35	43	Testing of the instruction
	44	Negative result of the test
	45	Positive result of the test
	46	Phase 1 of the dynamic channel allocation

	47	Reception without allocation information
	48	Transition
	49	Arrival of an allocation information item
	50	Phase 2 of the dynamic channel allocation
5	51	Reception of further allocation information items
	52	Failure of further allocation information items to appear
	60	State machine
	61	Static mode
10	62	Reduction in channel capacity
	63	Testing of the instruction
	64	Negative result of the test
	65	Positive result of the test
	66	Phase 1 of the dynamic channel allocation
15	67	Reception without acknowledgment
	68	Transition
	69	Arrival of an acknowledgment
	70	Phase 2 of the dynamic channel allocation
	71	Further reception with acknowledgments
20	72	Failure of acknowledgments to appear
	80	State machine
	81	Static mode
	82	Reduction in channel capacity
	83	Testing of the instruction
25	84	Negative result of the test
	85	Positive result of the test
	86	Phase 1 of the dynamic channel allocation
	87	Reception without withdrawal information items
	88	Transition
30	89	Arrival of a withdrawal information item
	90	Phase 2 of the dynamic channel allocation
	91	Reception of further withdrawal information items
	92	Failure of the withdrawal information items to appear

Patent claims:



- 5 1. A method for dynamic channel allocation in radio
 systems (1), particularly for wireless local loop (WLL)
 systems, by means of at least two stations (2, 3) which
 can be operated in each case as transmitter and receiver
 which communicate in parallel via a changing and differ-
10 ing number of channels, using a mapping algorithm, for
 which purpose mapping modules (6, 13) are arranged in the
 stations (2, 3), comprising the following method steps:
- a) establishing a station (2) as master and the other
 station (3) as slave,
- 15 b) deriving the channel demand from the current data
 transfer load by the master (3) and calculating new
 channel and link tables,
- c) transmitting the new channel and link tables to the
 mapping modules (6, 13) of the master (2) and of the
20 slave (3),
- d) sending out a reconfiguration signal from the master
 (2) to the slave (3),
- e) sending out an acknowledgment signal from the slave
 (3) to the master (2) after reception of the recon-
25 figuration signal and
- f) final execution of the reconfiguration by the master
 (2) and the slave (3), the reconfiguration signal
 and the acknowledgment signal being ignored by the
 mapping algorithm and the reconfiguration signal and
30 the acknowledgment signal overlapping in time with
 the allocation or withdrawal procedures for the
 channels on the side of the master (2) and of the
 slave (3).
2. Method as claimed in claim 1, wherein exactly one
35 virtual connection module (11) for each active slave (3)
 exists in the mapping module (6) of the master (2) and

also exactly one virtual connection module (15) exists in the mapping module (13) in the respective slave (3).

3. The method as claimed in claim 1 or 2, wherein the method of dynamic channel allocation is channel-related so that, when a plurality of channels are withdrawn or allocated, the method runs in parallel for each channel.

4. The method as claimed in one of the preceding claims, wherein, in the case of a fluctuating data transfer load, the new channel and link table generated by the master (2) is checked by the mapping modules (6, 13) of the master (2) and of the slave (3) whether the allocated channels are available or the connection capacity is adequate and, when the test result is negative, the new channel and link table are ignored and, if necessary, an alarm indication signal is transferred to the master (2), before the reconfiguration signal is sent out.

5. The method as claimed in one of the preceding claims, wherein, when expected signals do not arrive, the master (2) or the slave (3) return to their initial state after a presettable number of cycles or time and, if necessary, transfer an alarm indication signal to the master (2).

6. The method as claimed in one of the preceding claims, wherein, when the channel capacity is reduced, the channel to be taken out of operation is no longer used by the mapping algorithm at the master end in the transmitting direction and the master (2) sends a reconfiguration signal to the slave (3) via the channel to be taken out of operation, the slave (3) transmits an acknowledgment signal to the master (2) via the channel to be taken out of operation and then unties the channel from the mapping algorithm at the transmitting and receiving end, the master (2), after receiving the acknowledgment signal, unties the channel to be taken out of operation from the mapping algorithm at the receiving end and the mapping modules (6, 13) of the master (2) and of the



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slave (3) take the channel out of operation when further reconfiguration or acknowledgment signals are not received.

7. The method as claimed in one of claims 1 to 5, wherein, when channel capacity is allocated, the master (2) sends a reconfiguration signal to the slave (3) via the newly allocated channel without tying the channel into the mapping algorithm, the slave (3), after receiving the configuration signal, sends an acknowledgment signal to the master (2) and ties the channel into the mapping algorithm at the receiving end, the master (2), after receiving the acknowledgment signal, ties the channel into the mapping algorithm at the transmitting and receiving end and begins with the transmission of the useful data and the slave (3), after receiving the first useful data, also ties the channel into the mapping algorithm at the transmitting end.

8. A base station comprising a bidirectional interface connected to the telecommunication network, a mapping module and an RF module connected to the mapping module, wherein a protocol controller (5) is connected to the bidirectional interface (4) and a signal output of the protocol controller (5) is connected to the control inputs of the mapping module (6).

9. Base station as claimed in claim 8, wherein the mapping module (6) is formed by a multiplexer (10) on the network side and by virtual connection modules (11) on the radio side.

10. The base station as claimed in claim 9, wherein the signal output of the protocol controller (5) is connected both to the control inputs of the multiplexer (10) and of the virtual connection modules (11) of the mapping module (6).

11. User unit comprising an RF module arranged on the radio side and a mapping module, wherein the mapping module (13) is formed by a virtual connection module (15) on the radio side to the RF module (12) and by a



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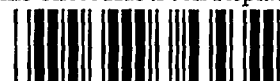


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multiplexer (14) on the user side.



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Method for dynamic channel allocation in radio systems,
especially for wireless local loop (WLL) systems, and
devices for carrying out the method

Abstract of the disclosure

The invention relates to a method for dynamic
channel allocation in radio systems (1), especially for
WLL systems, and devices for carrying out the method, in
which is ensured that the dynamic channel allocation
becomes effective simultaneously for both stations.

(Fig. 1)



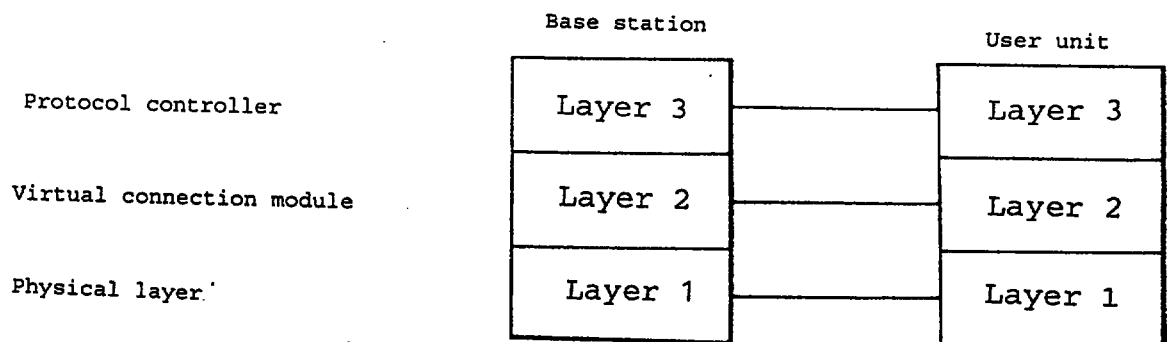


FIG.3

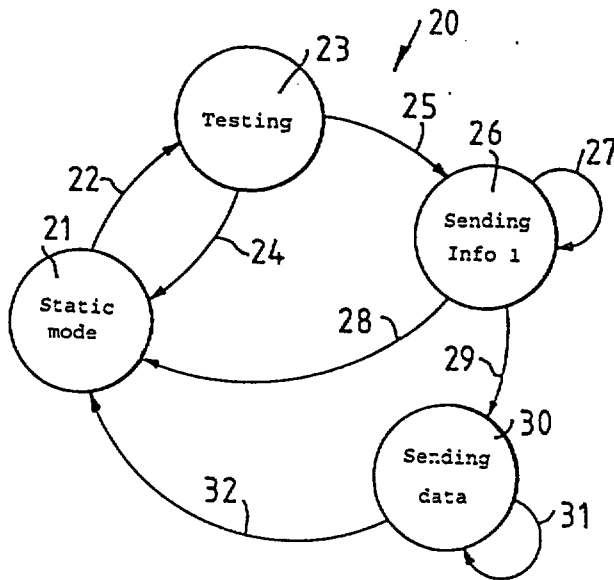


FIG.4

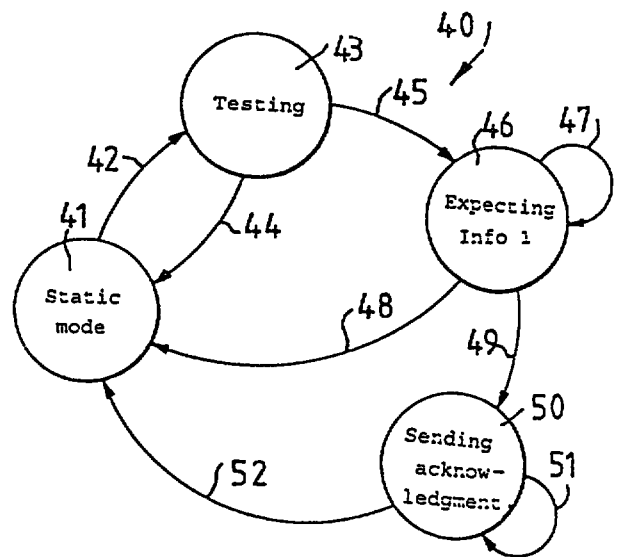


FIG.5

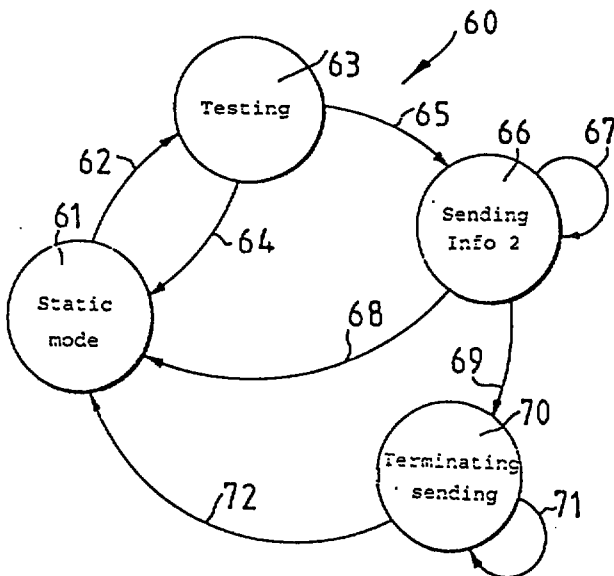
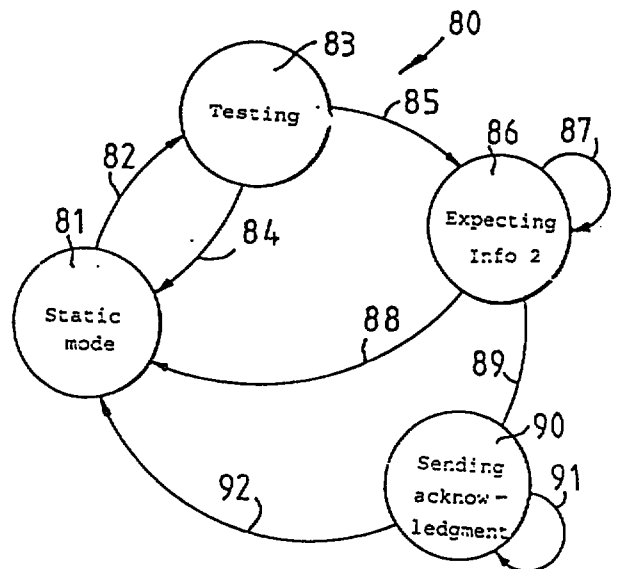
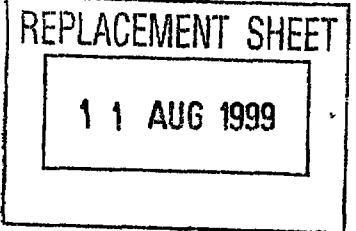


FIG.6





also exactly one virtual connection module (15) exists in the mapping module (13) in the respective slave (3).

3. The method as claimed in claim 1 or 2, wherein the method of dynamic channel allocation is channel-related so that, when a plurality of channels are
5 with-drawn or allocated, the method runs in parallel for each channel.

4. The method as claimed in any one of the preceding claims, wherein, in the case of a fluctuating data transfer load, the new channel and link table generated by the master (2) is checked by the mapping modules (6,13) of the
10 master (2) and of the slave (3) whether the allocated channels are available or the connection capacity is adequate and, when the test result is negative, the new channel and link table are ignored and, if necessary, an alarm indication signal is transferred to the master (2), before the reconfiguration signal is sent out.

5. The method as claimed in any one of the preceding claims, wherein, when
15 expected signals do not arrive, the master (2) of the slave (3) return to their initial state after a presettable number of cycles or time and, if necessary, transfer an alarm indication signal to the master (2).

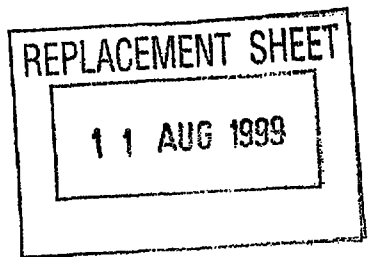
6. The method as claimed in any one of the preceding claims, wherein, when
20 the channel capacity is reduced, the channel to be taken out of operation is no longer used by the mapping algorithm at the master end in the transmitting direction and the master (2) sends a reconfiguration signal to the slave (3) via the channel to be taken out of operation,

the slave (3) transmits an acknowledgement signal to the master (2) via the channel to be taken out of operation and then unties the channel from the
25 mapping algorithm at the transmitting and receiving end,

the master (2), after receiving the acknowledgement signal, unties the channel to be taken out of operation from the mapping algorithm at the receiving end and the mapping modules (6, 13) of the master (2) and of the slave (3) take the channel out of operation when further reconfiguration or acknowledgement
30 signals are not received.



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7. The method as claimed in any one of claims 1 to 5, wherein, when channel capacity is allocated,

the master (2) sends a reconfiguration signal to the slave (3) via the newly
5 allocated channel without tying the channel into the mapping algorithm,
the slave (3), after receiving the configuration signal, sends an acknowledgement
signal to the master (2) and ties the channel into the mapping algorithm at the
receiving end,

the master (2), after receiving the acknowledgement signal, ties the channel into
10 the mapping algorithm at the transmitting and receiving end and begins with the
transmission of the useful data and

the slave (3), after receiving the first useful data, also ties the channel into the
mapping algorithm at the transmitting end.

8. A base station operable to perform, together with at least one user unit,
15 the method of any one of the preceding claims, the base station comprising a
bidirectional interface connected to a telecommunication network, a mapping
module and an RF module connected to the mapping module, wherein a protocol
controller (5) is connected to the bidirectional interface (4) and a signal output of
the protocol controller (5) is connected to the control inputs of the mapping
20 module (6).

9. Based station as claimed in claim 8, wherein the mapping module (6) is
formed by a multiplexer (10) on the network side and by virtual connection
modules (11) on the radio side.

10. The base station as claimed in claim 9, wherein the signal output of the
25 protocol controller (5) is connected both to the control inputs of the multiplexer
(10) and of the virtual connection modules (11) of the mapping module (6).

11. A user unit operable to perform, together with a base station, the method
of any one of claims 1 - 7, the user unit comprising an RF module arranged on a
radio side and a mapping module, wherein the mapping module (13) is formed
30 by a virtual connection module (15) on the radio side to the RF module (12) and



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by a multiplexer (14) on a user side.

