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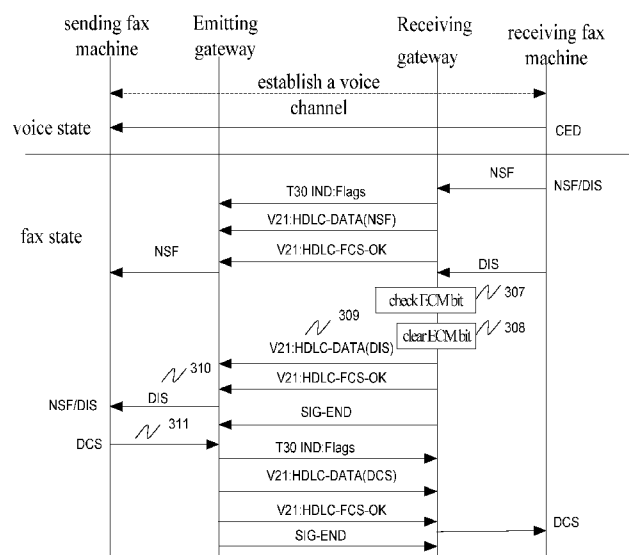


Figure 3

(57) Abstract: The present invention proposes a method for processing a Group 3 fax call on a gateway connecting a sending fax machine and a receiving fax machine to an IP network, the method comprising: when receiving a digital identification signal DIS sent by the receiving fax machine, checking whether an error correction mode ECM bit in the digital identification signal has been set or not; and, where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared. The present invention further provides a gateway device for connecting a sending fax machine and a receiving fax machine to an IP network.

METHOD AND GATEWAY DEVICE FOR PROCESSING A FAX CALL

Technical Field

The present invention relates to a communication network, and more specifically, to a
5 method and gateway device for processing a Group 3 fax call in the communication network.

Description of the Related Art

T.30 protocol released by the International Telecommunication Union ITU in September,
2005 is procedures for fax sending and receiving of PSTN network-based Group 3 fax
10 machine (hereinafter referred to as the G3 fax machine) (see SERIES T:TERMINALS FOR
TELEMATIC SERVICES, Procedures for document fax transmission in the general switched
telephone network). The protocol defines command interactions and corresponding
processing procedures in stages like when sending and receiving fax machine starting
negotiation, before sending a message, when sending a message, after sending a message, and
15 when being broken off.

T.38 protocol released by the ITU in September, 2005 is Procedures for real-time Group
3 fax communication over IP networks (see SERIES T: Procedures for real-time Group 3 fax
communication over IP networks). In addition to transmission for PSTN or ISDN part, the fax
system transmission process defined by T.38 further includes transmission for IP network part.
20 In the T.38 architecture, an Emitting gateway connects to a calling G3 fax machine, and a
Receiving gateway connects to a called G3 fax machine. A fax signal is first modulated by a
voice/fax gateway, and then transferred in the form of IP fax packet in an IP network through
UDP protocol.

ECM mode is a transmission way for page data encoded using T.4, specified by T.30
25 protocol. It divides one page of data into several blocks, one block consisting of 256 frames,
one frame being 64 bytes or 256 bytes, which may be negotiated in Digital Identification
Signal (DIS)/Digital Command Signal (DCS) phase. A sending fax machine sends page data
using a frame as a unit, and when a receiving fax machine needs re-transmission, it only needs
to send a command to the sending fax machine to indicate which frame needs to be
30 retransmitted, and then the sending fax machine only retransmits the frame data. The ECM
mode may enhance error correction capability of fax, and speed up the efficiency of fax
interaction.

In current use, both the calling and called G3 fax machines are configured into the ECM

mode which G3 fax machines support, and both the Emitting and Receiving gateways are configured to use T.38 but the Receiving gateway can't support T4 ECM packets from the Emitting gateway properly. When the Calling G3 fax machine and Called G3 fax machine are negotiated to use ECM mode for T.38 call, the T.38 call will always fail, especially at the case of different vendor's gateway intercommunication. One known solution is

- In transmit direction, the Emitting gateway demodulates a V.21DIS/DCS HDLC (HDLC=high-level data link control procedure) signal from TDM side, but doesn't change the ECM, and then the signal is packaged into an IFP packet;

- In receive direction, the Receiving gateway receives a V.21 IFP packet from an IP network, but doesn't change the ECM, and then the packet is modulated into a V.21 HDLC signal;

- If the gateway doesn't support t38FaxMaxDatagram value negotiated in call-setup such as using SDP protocol so that the Emitting gateway packages complete HDLC frame data only into an IFP package, then the IFP package will be very big (272 bytes), while the Receiving gateway generally buffers the received IFP packet, then there is a limit to the size of the received IFP packet. Since there are no explicit provisions in the T.38 specification, the gateway device of each vendor does not have the same limit and processes it not in the same way specifically. If the maximum size of the Receiving gateway for the received IFP packet is less than 272 bytes, the direct result is that it cannot deal with this kind of big IFP packet correctly;

- Even if some gateway supports t38FaxMaxDatagram value negotiation in call-setup but soft switch does not support the negotiation for this parameter or the opposite gateway on the IP network side does not support the negotiation for this parameter, so that the Emitting gateway packages complete HDLC frame data only into an IFP package, then the size of the IFP package will be very big (272 bytes), and the above case where this kind of big IFP packet cannot be dealt with correctly will occur again. In practical applications, there are often situations where the switching speed of the gateway is slow or the detection of fax event by the gateway failed, caused by complex soft switch networking, and so on, and because the T.38 gateway's intervention on DIS signal can only be done in the T.38 fax status, for the occurrence of the two situations, the DIS signal will be made to be transferred transparently in voice mode (in a voice way) to the sending fax machine. The DCS frame signal causing the fax machine to respond sends fax page messages by selecting ECM, finally still causing T.38 gateways of different vendors to negotiate both in the sending fax machine and in the

receiving fax machine that fax page messages are sent in ECM mode. Figure 1b shows the deficiency of the prior art.

To sum up, in existing solutions, when the calling G3FE and the called G3FE are negotiated to use ECM mode for T.38 call, since the gateway can't change the ECM in V.21 DIS/DCS HDLC signals in both transmit and receive directions, the Emitting gateway would send improper T4 ECM packets to the Receiving gateway, making the Receiving gateway unable to process these T4 ECM packets received from peer gateway correctly. As a result, the T.38 fax call will fail.

10 Summary of the Invention

In order to overcome the above defects in the prior art, the present invention attempts to improve the existing T.38 gateway to increase the success ratio of a T.38 call between different T.38 gateways.

The present invention provides a method for processing a Group 3 fax call on a gateway connecting a sending fax machine and a receiving fax machine to an IP network, the method comprising: when receiving a digital identification signal DIS sent by the receiving fax machine, checking whether an error correction mode ECM bit in the digital identification signal has been set or not; and, where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

In an embodiment of the invention, the gateway comprises an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine, the Emitting gateway or the Receiving gateway executing the above checking and clearing steps.

The invention provides a gateway for processing a Group 3 fax call, the gateway connecting a sending fax machine and a receiving fax machine to an IP network, the gateway comprising: a checking module for, when receiving a digital identification signal DIS sent by the receiving fax machine, checking whether an error correction mode ECM bit in the digital identification signal has been set or not; and, a clearing module for, where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

In an embodiment of the invention, the gateway for processing a Group 3 fax call further comprises an Emitting gateway connecting to the sending fax machine and a Receiving

gateway connecting to the receiving fax machine, the Emitting gateway or the Receiving gateway comprising the checking module and the clearing module.

The present invention further provides a method for processing a Group 3 fax call on a gateway connecting a sending fax machine and a receiving fax machine to an IP network, the method comprising: when receiving a digital command signal DCS sent by the sending fax machine, checking whether an ECM bit has been set or not; where the ECM bit has been set, setting frame check sequence FCS of the DCS signal to wrong; when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS signal containing FCS being wrong, checking whether an ECM bit in the digital identification signal DIS has been set or not; and, where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

According to an embodiment of the invention, the gateway comprises an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine.

According to a preferred embodiment of the invention, when receiving a digital command signal DCS sent by the sending fax machine, the Emitting gateway checks whether an ECM bit has been set or not and where the ECM bit has been set, sets frame check sequence FCS of the DCS signal to wrong.

According to a preferred embodiment of the invention, when receiving a digital command signal DCS sent by the sending fax machine, the Receiving gateway checks whether an ECM bit has been set or not and where the ECM bit has been set, sets frame check sequence FCS of the DCS signal to wrong.

According to a preferred embodiment of the invention, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS signal, the Emitting gateway checks whether an ECM bit in the digital identification signal DCS has been set or not, and, where the ECM bit has been set, clears the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

According to a preferred embodiment of the invention, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS signal containing FCS being wrong, the Receiving gateway checks whether an ECM bit in the digital identification signal DIS has been set or not, and, where the ECM bit has been set,

clears the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

According to a preferred embodiment of the invention, setting frame check sequence FCS of the DCS signal to wrong comprises setting the FCS check bit as failed FCS-BAD or
5 changing the FCS check sequence using a random value.

Another aspect of the invention provides a gateway for processing a Group 3 fax call, the gateway connecting a sending fax machine and a receiving fax machine to an IP network, the gateway comprising: a DCS signal checking module for, when receiving a digital command
10 signal DCS sent by the sending fax machine, checking whether an ECM bit has been set or not; an FCS setting module for, where the ECM bit has been set, setting frame check sequence FCS of the DCS signal to wrong; a DIS signal checking module for, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS, checking whether an ECM bit in the digital identification signal DIS has been set or not; and,
15 a clearing module for, where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

According to a preferred embodiment of the invention, the gateway comprises an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine.

According to a preferred embodiment of the invention, the Emitting gateway or the
20 Receiving gateway comprises a DCS signal checking module and an FCS setting module, and the Receiving gateway or the Emitting gateway comprises a DIS signal checking module and a clearing module.

According to a preferred embodiment of the invention, the FCS setting module is
25 configured to set the FCS check bit to failed FCS-BAD or to change the FCS check sequence using a random value.

The invention can start a T.38 call between two T.38 gateways with fixed Non-ECM mode, while both the sending fax machine (Calling G3FE) and the receiving fax machine (Called G3FE) support ECM mode but one of the access gateways can't support ECM mode
30 properly.

The present invention can improve the success ratio of a T.38 call between different T.38 gateways, especially at the case of different device vendor's gateway intercommunication. The mechanism of the present invention can use non-ECM mode to automatically transfer fax

page data without human intervention.

Brief Description of the Drawings

Now exemplary embodiments of the present invention will be described below with reference to the drawings. It should be understood that the following drawings and embodiments are completely for the purpose of explaining the basic principle of the present invention, not to limit the scope of protection of the present invention, wherein:

Figure 1a is a schematic structural diagram of real-time fax system in a T.38 system network in the prior art;

Figure 1b is a schematic flowchart of DIS which a gateway cannot intervene when it arrives at the sending fax machine in voice state in the prior art;

Figure 2 is a schematic structural diagram of DIS and DCS frames in the method in which the T.38 gateway processes a standard frame in the embodiment of the invention;

Figure 3 is a flowchart showing a first embodiment according to the present invention;

Figure 4 is a flowchart showing a second embodiment according to the present invention;

Figure 5 is a flowchart showing a third embodiment according to the present invention;

Figure 6 is a flowchart showing a fourth embodiment according to the present invention;

Figure 7 is a schematic functional diagram of a T.38 gateway according to an embodiment of the present invention; and

Figure 8 is a schematic functional diagram of a T.38 gateway according to an embodiment of the present invention.

Detailed Description of the Preferred Embodiment

Now with reference to the drawings, a variety of exemplary embodiments may be described more comprehensively. It should be pointed out that specific structural and functional details disclosed here are merely to describe the exemplary embodiments. The exemplary embodiments may be embodied through many alternative forms and cannot be regarded merely limited to the embodiments described herein.

As shown in Figure 1a, a typical G3 fax terminal connects to a gateway, and then, transfers fax through an IP network to a destination gateway which then transfers fax through PSTN to a fax machine complying with G3. Once the call set up PSTN, G3 terminals will establish a logical connection.

Figure 3 shows a message flowchart according to a first embodiment of the present invention. In this embodiment, both the sending fax machine and the receiving fax machine support ECM mode of a T.38 call, whereby the ECM bit in a V.21 DIS HDLC signal sent by the receiving fax machine (i.e., the bit 27 in the structure of DIS frame shown in Figure 2) should be set.

The Receiving gateway has already been in T.38 mode, and when the Receiving gateway receives a V.21 DIS HDLC signal from the TDM side, the Receiving gateway will check whether the ECM bit has been set (i.e. whether the bit 27 is "1"), as shown in step 307. Where the ECM bit has been set, the ECM bit is cleared in step 308, that is, the bit 27 is changed to "0". Next, the Receiving gateway packages the modified the V.21 DIS HDLC signal into IFP packets and sends them to the IP network, namely, step 309.

In a subsequent step 310, the Emitting gateway receives the V.21 IFP packets from the IP network, without modifying any value in the DIS, but merely modulating them into a V.21 DIS HDLC signal and sending them to the TDM side. The sending fax machine receives a DIS signal with ECM bit which has been cleared, and then responds with a V.21 DCS HDLC signal, as shown in step 311. The transmitted T.30 sequence should comply with the T.30 protocol of non-ECM mode. Finally, the sending fax machine and the receiving fax machine use non-ECM mode to start a T.38 call.

Figure 4 shows a message flowchart according to a second embodiment of the present invention. In this embodiment, both the sending fax machine and the receiving fax machine support ECM mode of a T.38 call, whereby the ECM bit in a V.21 DIS HDLC signal sent by the receiving fax machine (i.e., the bit 27 in the structure of DIS frame shown in Figure 2) should be set.

The Receiving gateway has already been in T.38 mode, whereby when it receives a V.21 DIS HDLC signal from the TDM side, the Receiving gateway does not clear the ECM bit but merely packages the V.21 DIS HDLC signal into IFP packets and sends them to the IP network, as shown in step 402.

In step 407, the Emitting gateway receives the V.21 IFP packets from the IP network, checks whether the ECM bit in the DIS signal has been set. Where the ECM bit has been set, as shown in step 408, the ECM bit in the DIS signal is cleared, that is, the bit 27 is set to "0". Next, the Emitting gateway modulates the modified V.21 IFP packets into V.21 DIS HDLC signals and sends them to the TDM side, namely step 409.

In a subsequent step, the Emitting gateway receives the DIS signals with ECM bit being

cleared, and then responds with a V.21 DCS HDLC signal which merely uses non-ECM mode, as shown in step 410. The transmitted T.30 sequence should comply with the T.30 protocol of non-ECM mode. Finally, the sending fax machine and the receiving fax machine use non-ECM mode to start a T.38 call.

5 Figure 5 shows a message flowchart according to a third embodiment of the present invention. In this embodiment, both the sending fax machine (i.e., calling G3 fax device) and the receiving fax machine (i.e., called G3 fax device) support ECM mode of a T.38 call, whereby the ECM bit in a V.21 DIS HDLC signal sent by the receiving fax machine (i.e., the bit 27) should have been set. The Receiving gateway is not in T.38 mode, whereby it receives
10 V.21 DIS HDLC signals from the TDM side, but transfers them transparently in voice mode. The Receiving gateway does not modify any value in the DIS signal and sends them to the IP network. The Emitting gateway receives V.21 DIS HDLC signals in voice mode, and also does not transfer them transparently to the TDM side. This part is briefly shown in the voice state phase in Figure 5, and will not be described in detail any more since it has nothing to do
15 with the theme of the invention, so as not to confuse the invention.

The Emitting fax machine receives the DIS signal with ECM bit being set, and then responds with V.21 DCS HDLC signals which use ECM mode. This process is shown in step 501 in Figure 5.

As shown in step 502, the Emitting gateway has already been in T.38 mode, and it
20 receives V.21 DCS HDLC signals from the TDM side and then determines whether the ECM bit has been set or not. In step 503, if the ECM bit, i.e., the bit 27 in Figure 2, has been set, no matter the FCS check of the DCS signals is OK or BAD, the Emitting gateway makes the FCS check forcibly set to wrong. In this embodiment, the FCS check bit is set to FCS-BAD.

The Emitting gateway packages the modified V.21 DCS HDLC signals into IFP packets
25 and sends them to the IP network, as shown in step 504. The Receiving gateway has already been in T.38 mode, whereby it receives V.21 IFP packets from the IP network but does not modify any value in the DCS, only modulates them into V.21 DCS HDLC signals and sends them to the TDM side, as shown in step 505. The receiving fax machine receives a DCS signal, whose FCS check sequence is wrong, and responds with a V.21 DIS signal once again,
30 in which the error correction bit (bit 27) is also set, and this process is shown in step 506.

Next the re-negotiation process between the sending fax machine and the receiving fax machine is started, the following steps 507, 508 and 509 being similar with steps 307, 308, 309 in the first embodiment. Specifically, in step 507, the Receiving gateway will check

whether ECM bit has been set (i.e. whether the bit 27 is "1" or not). Where the ECM bit has been set, the ECM bit is cleared in step 508, that is, the bit 27 is set to "0". The Receiving gateway packages the modified V.21 DIS HDLC signals into IFP packets and sends them to the IP network, namely step 509. Finally the sending fax machine and the receiving fax machine use non-ECM mode to start a T.38 call.

In variants of the third embodiment of the invention, after the Receiving gateway executes step 506, the DIS signal may not be processed, while the processing is executed by the Emitting gateway, that is, the Emitting gateway executes steps 507 and 508. On the premise of understanding the basic idea of the invention, it is not very difficult for those skilled in the art to implement such variants.

Figure 6 shows a message flowchart according to a fourth embodiment of the present invention. In this embodiment, both the sending fax machine and the receiving fax machine support ECM mode of a T.38 call, whereby the ECM bit in a V.21 DIS HDLC signal sent by the receiving fax machine (i.e., the bit 27 in Figure 2) should be set. The Receiving gateway is not in T.38 mode, and it receives V.21 DIS HDLC signals from the TDM side, but transfers them transparently in voice mode; the Receiving gateway does not modify any value in the DIS signal and sends them to the IP network; the Emitting gateway receives V.21 DIS HDLC signals in voice mode, also does not modify any value in the DIS and then transfers them transparently to the TDM side. This part is briefly shown in the voice state phase in Figure 6, and will not be described in detail any more since it has nothing to do with the theme of the invention, so as not to confuse the invention.

The Emitting fax machine receives the DIS signal with ECM bit being set, and then responds with a V.21 DCS HDLC signal which uses ECM mode, as shown in step 601. The Emitting gateway has already been in T.38 mode, and it receives the V.21 DCS HDLC signal from the TDM side but does not modify any value in DCS, whereby the Emitting gateway packages them into IFP packets and sends them to the IP network, as shown in step 601'.

The Receiving gateway has already been in T.38 mode, and in step 602, it receives V.21 DCS IFP packets from the IP network and determines whether the ECM bit has been set or not. If the ECM bit, i.e., the bit 27, has been set, no matter the FCS check of the DCS signals is OK or BAD, in step 603, the FCS check sequence is forcibly modified with a random value. After step 603, the Receiving gateway modulates modified V.21 IFP packets into V.21 DCS HDLC signals and sends them to the TDM side.

The receiving fax machine receives a DCS signal wherein the FCS check sequence is

wrong, and responds with a V.21 DIS signal once again in step 604, in which the ECM bit is also set. From now on, the re-negotiation process between the sending fax machine and the receiving fax machine is started, and the following negotiation process is also the same as the process in the first embodiment. Specifically, in step 607, the Receiving gateway will check whether ECM bit has been set (i.e. whether the bit 27 is "1" or not). Where the ECM bit has been set, the ECM bit is cleared in step 608, that is, the bit 27 is set to "0". The Receiving gateway packages the modified V.21 DIS HDLC signals into IFP packets and sends them to the IP network, namely step 609. Finally the sending fax machine and the receiving fax machine use non-ECM mode to start a T.38 call.

In variants of the fourth embodiment of the invention, after the Receiving gateway executes step 604, the DIS signal may not be processed, while the processing is executed by the Emitting gateway, that is, the Emitting gateway executes steps 607 and 608. On the premise of understanding the basic idea of the invention, it is not very difficult for those skilled in the art to implement such variants.

Figure 7 shows a schematic functional diagram of a T.38 gateway according to an embodiment of the present invention. In order to implement the procedures of processing Group 3 fax call as described in the first and second embodiments of the invention, the gateway device according to the present invention typically includes a checking module 707 and a clearing module 708.

In one example of a gateway device of the present invention, the Receiving gateway has already been in T.38 mode, and when the Receiving gateway receives V.21 DIS HDLC signals from the TDM side, the checking module 707 of the Receiving gateway will check whether the ECM bit has been set or not (i.e. whether the bit 27 is "1" or not). Where the ECM bit has been set, the clearing module 708 clears the ECM bit, that is, the bit 27 is set to "0". The Receiving gateway (specifically, such as an existing transfer device) packages the modified V.21 DIS HDLC signals into IFP packets and sends them to the IP network.

In another embodiment of a gateway device of the present invention, for example, the Emitting gateway receives V.21 IFP packets from the IP network, and the checking module 707 checks whether the ECM bit in the DIS signal has been set or not. Where the ECM bit has been set, the clearing module 708 clears the ECM bit in the DIS signal, that is, the bit 27 is set to "0". Then the Emitting gateway modulates the modified V.21 IFP packets into V.21 DIS HDLC signals and sends them to the TDM side.

Figure 8 shows a schematic functional diagram of a T.38 gateway according to other

embodiments of the present invention. In order to implement the procedures of processing Group 3 fax call as described in the third and fourth embodiments of the invention, the gateway device according to the present invention typically includes a DCS signal checking module 802 for, when receiving a digital command signal DCS sent by the sending fax machine, checking whether an ECM bit has been set or not; an FCS setting module 803 for, where the ECM bit has been set, setting frame check sequence FCS of the DCS signal to wrong; a DIS signal checking module 807 for, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS, checking whether an ECM bit in the digital identification signal DIS has been set or not; and, a clearing module 808 for, where the ECM bit has been set, clearing the ECM bit; thereafter, the digital identification signal DIS with the ECM bit being cleared will be transferred to the sending fax machine so that the sending fax machine starts a non-ECM fax call.

Functions of the DIS signal checking module 807 and clearing module 808 are similar to those of modules 707 and 708 in Figure 7, and will be described no more herein.

It should be noted that, back to Figure 5, the Emitting gateway has already been in T.38 mode, and if the Emitting gateway receives the V.21 DCS HDLC signal from the TDM side, they are packaged as usual into IFP packets and sent to the IP network. But before this, the DCS signal checking module 802 of the Emitting gateway needs to check the ECM bit in the DCS signal, namely, the bit 27. If the bit is set, regardless of the checking result of the FCS to V.21 DCS HDLC signals, the FCS setting module 803 forcibly makes the FCS check bit as HDLC-FCS-Bad.

Then, the modules 807 and 808 continue executing DIS signal checking and ECM mode clearing functions.

Back to Figure 6, if the Receiving gateway receives V.21 DCS IFP packets from the IP network, modulates them into V.21 DCS HDLC signals as usual and sends them to the TDM side. But before this, the DCS signal checking module of the receiving gateway 802 must check the ECM bit in the DCS signal. If that bit is set, no matter it is HDLC-FCS-Ok or HDLC-FCS-Bad, the FCS setting module 803 forcibly changes the FCS frame check sequence with a random value, so that the FCS check on the receiving fax machine fails. Then, the modules 807 and 808 continue executing functions like DIS signal checking and ECM mode clearing functions.

In Figure 8, modules 802, 803 are located on the Emitting gateway, and modules 807 and 808 are located on the Receiving gateway. It should be noted that other combinations are also

possible, for example, all of these five modules are located on the Emitting or Receiving gateway, or, modules 802, 803 are located on the Receiving gateway module, and modules 807 and 808 are located on the Emitting gateway.

It should be pointed out that, the concepts Receiving gateway and Emitting gateway mentioned in the invention are merely distinguished in terms of logic function, whereas they may be independent gateway devices in different locations, may also be receiving sides and sending side of the same gateway device, and they may belong to gateway devices of the same vendor and may also be of different vendors. In addition, those skilled in the art easily understand that functional components, elements or modules included by a typical T.38 gateway are far more than those described in Figures 7, 8 as well as related embodiments, while in order to make the description of the present invention clear, parts unrelated with the present invention are omitted in the description. In addition, as to the invention, the terms "calling G3 fax machine" and "sending fax machine" as well as "called G3 fax machine" and "receiving fax machine" in the text have the same meaning.

All various elements shown in the drawings or described herein may be implemented as hardware, software, firmware, or some combination thereof.

Those skilled in the art should understand that the description with reference to the drawings is merely illustrative, not to limit the scope of the present invention. Within the spirit and scope of the invention defined by the claims, those skilled in the art may envisage various modifications and variants.

CLAIMS

1. A method for processing a Group 3 fax call on a gateway connecting a sending fax machine and a receiving fax machine to an IP network, the method comprising:

when receiving a digital identification signal DIS sent by the receiving fax machine,
5 checking whether an error correction mode ECM bit in the digital identification signal has been set or not; and

where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

10 2. The method of claim 1, wherein the gateway comprises an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine, the Emitting gateway or the Receiving gateway executing the above checking and clearing steps.

3. A gateway for processing a Group 3 fax call, the gateway connecting a sending fax
15 machine and a receiving fax machine to an IP network, comprising:

a checking module for, when receiving a digital identification signal DIS sent by the receiving fax machine, checking whether an error correction mode ECM bit in the digital identification signal has been set or not; and

a clearing module for, where the ECM bit has been set, clearing the ECM bit, so that the
20 sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

4. The gateway of claim 3, further comprising an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine, the Emitting gateway or the Receiving gateway comprising the checking module and the clearing
25 module.

5. A method for processing a Group 3 fax call on a gateway connecting a sending fax machine and a receiving fax machine to an IP network, the method comprising:

when receiving a digital command signal DCS sent by the sending fax machine, checking whether an ECM bit has been set or not;

30 where the ECM bit has been set, setting frame check sequence FCS of the DCS signal to wrong;

when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS signal containing FCS being wrong, checking whether an ECM bit in

the digital identification signal DIS has been set or not; and

where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

5 6. The method of claim 5, wherein the gateway comprises an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine.

7. The method of claim 6, wherein, when receiving a digital command signal DCS sent by the sending fax machine, the Emitting gateway checks whether an ECM bit has been set or
10 not and where the ECM bit has been set, sets frame check sequence FCS of the DCS signal to wrong.

8. The method of claim 6, wherein, when receiving a digital command signal DCS sent by the sending fax machine, the Receiving gateway checks whether an ECM bit has been set or not and where the ECM bit has been set, sets frame check sequence FCS of the DCS signal
15 to wrong.

9. The method of claim 7 or 8, wherein, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS signal, the Emitting gateway checks whether an ECM bit in the digital identification signal DCS has been set or not, and, where the ECM bit has been set, clears the ECM bit, so that the sending fax machine starts a
20 non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

10. The method of claim 7 or 8, wherein, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS signal containing FCS being wrong, the Receiving gateway checks whether an ECM bit in the digital identification signal
25 DIS has been set or not, and, where the ECM bit has been set, clears the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

11. The method of any one of claims 5 to 7, wherein, setting frame check sequence FCS of the DCS signal to wrong comprises setting the FCS check bit as failed FCS-BAD or
30 changing the FCS check sequence using a random value.

12. A gateway for processing a Group 3 fax call, the gateway connecting a sending fax machine and a receiving fax machine to an IP network, the gateway comprising:

a DCS signal checking module for, when receiving a digital command signal DCS sent

by the sending fax machine, checking whether an ECM bit has been set or not;

an FCS setting module for, where the ECM bit has been set, setting frame check sequence FCS of the DCS signal to wrong;

5 a DIS signal checking module for, when receiving a digital identification signal DIS sent by the receiving fax machine responsive to the DCS, checking whether an ECM bit in the digital identification signal DIS has been set or not; and

a clearing module for, where the ECM bit has been set, clearing the ECM bit, so that the sending fax machine starts a non-ECM fax call based on the digital identification signal DIS with the ECM bit being cleared.

10 13. The gateway of claim 12, wherein the gateway comprises an Emitting gateway connecting to the sending fax machine and a Receiving gateway connecting to the receiving fax machine.

14. The gateway of claim 13, wherein, the Emitting gateway or the Receiving gateway comprises a DCS signal checking module and an FCS setting module, and the Receiving
15 gateway or the Emitting gateway comprises a DIS signal checking module and a clearing module.

15. The gateway of any one of claims 12 to 14, wherein, the FCS setting module is configured to set the FCS check bit to failed FCS-BAD or to change the FCS check sequence using a random value.

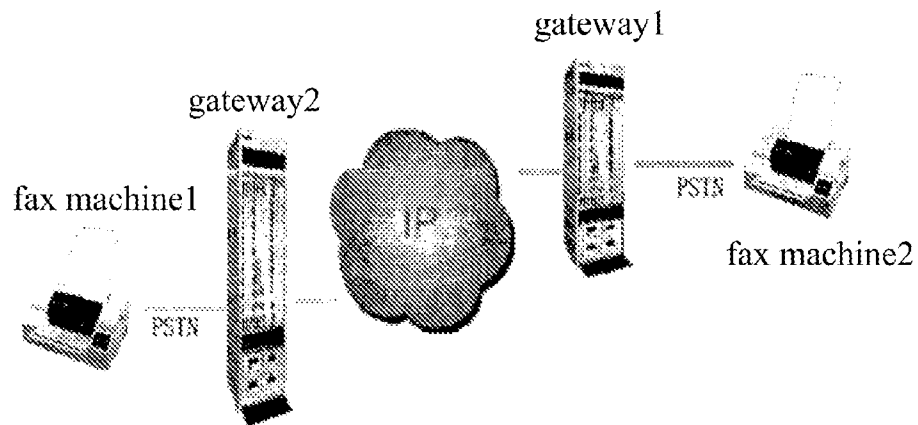


Figure 1a

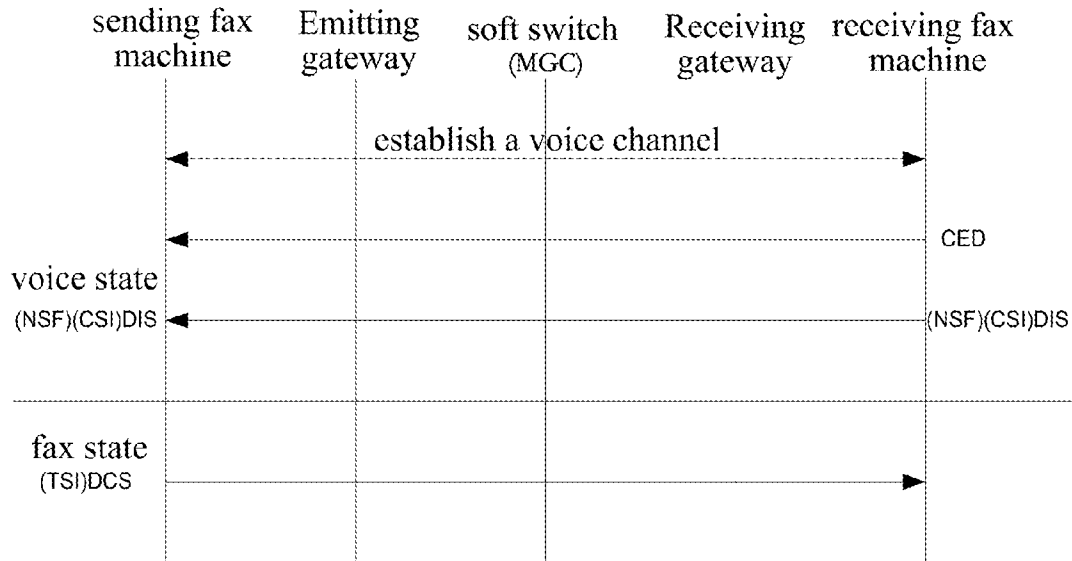


Figure 1b

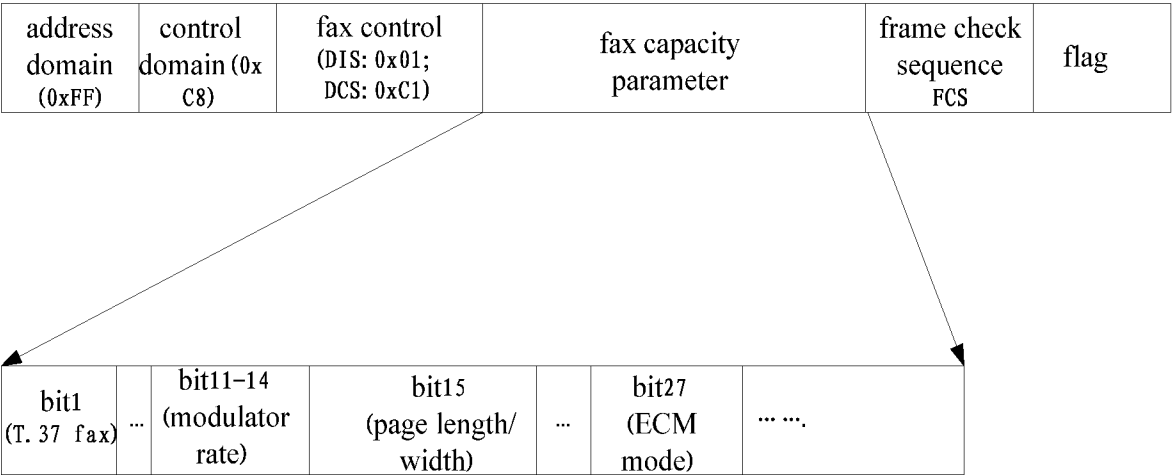


Figure 2

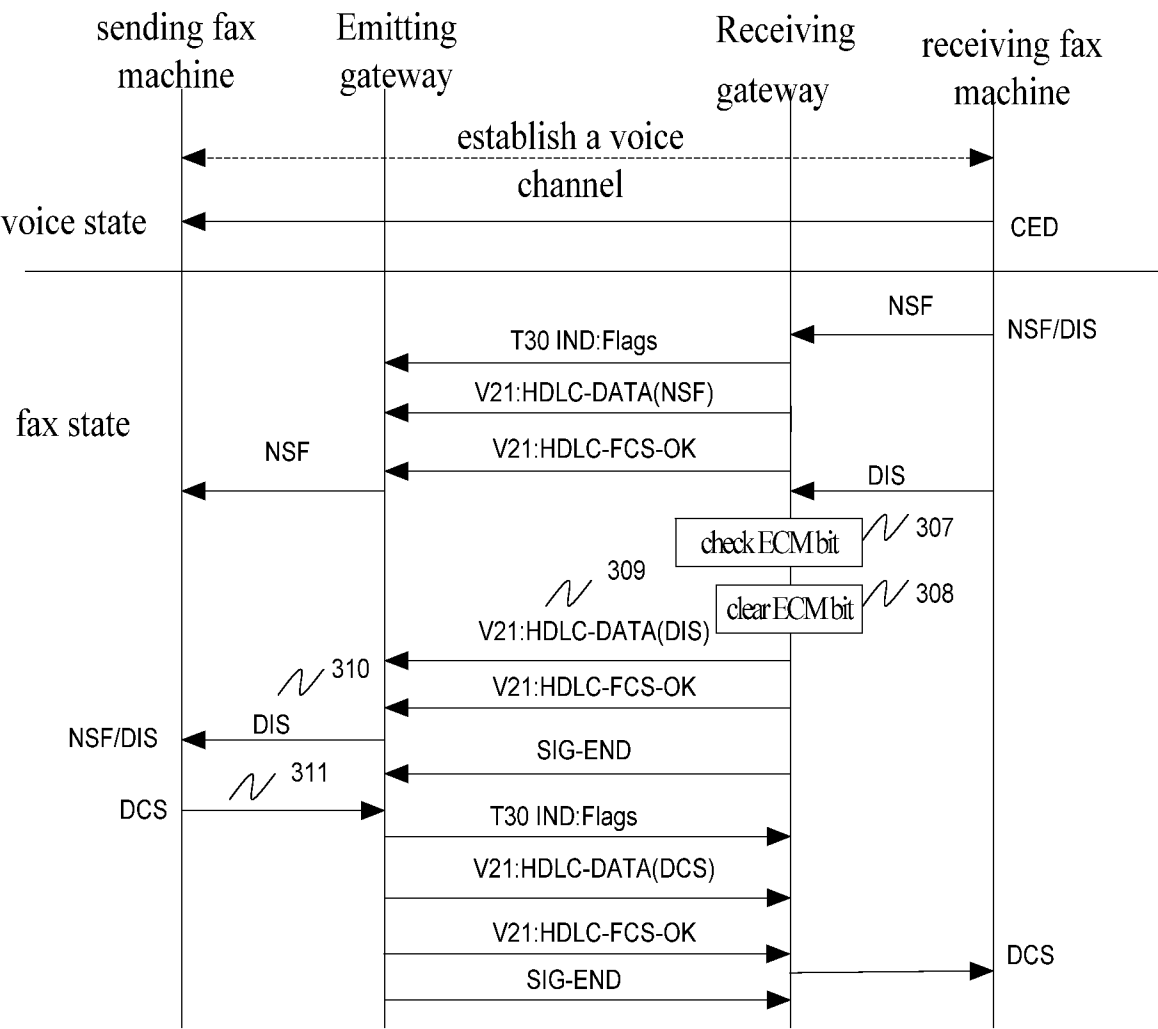


Figure 3

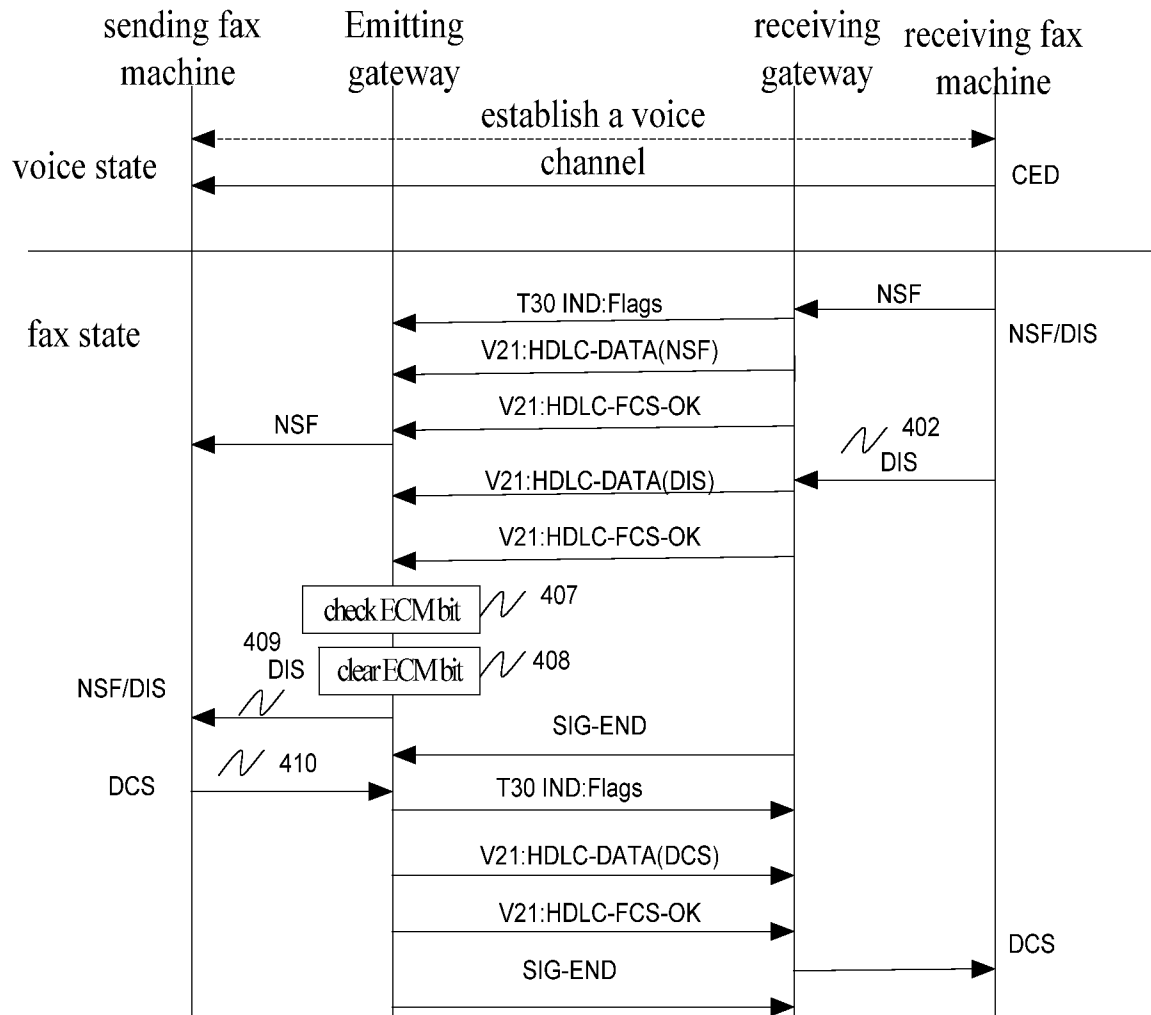


Figure 4

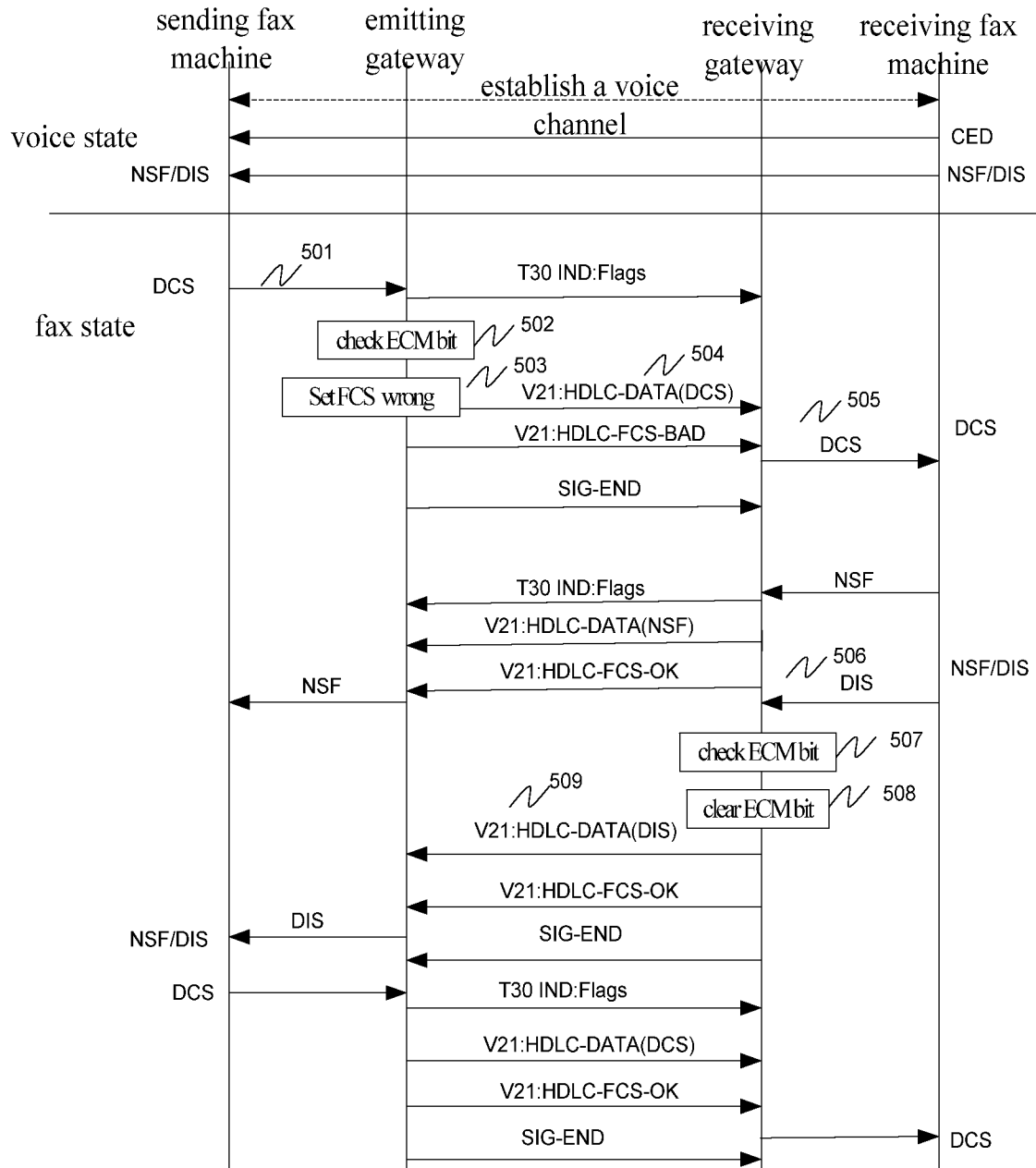


Figure 5

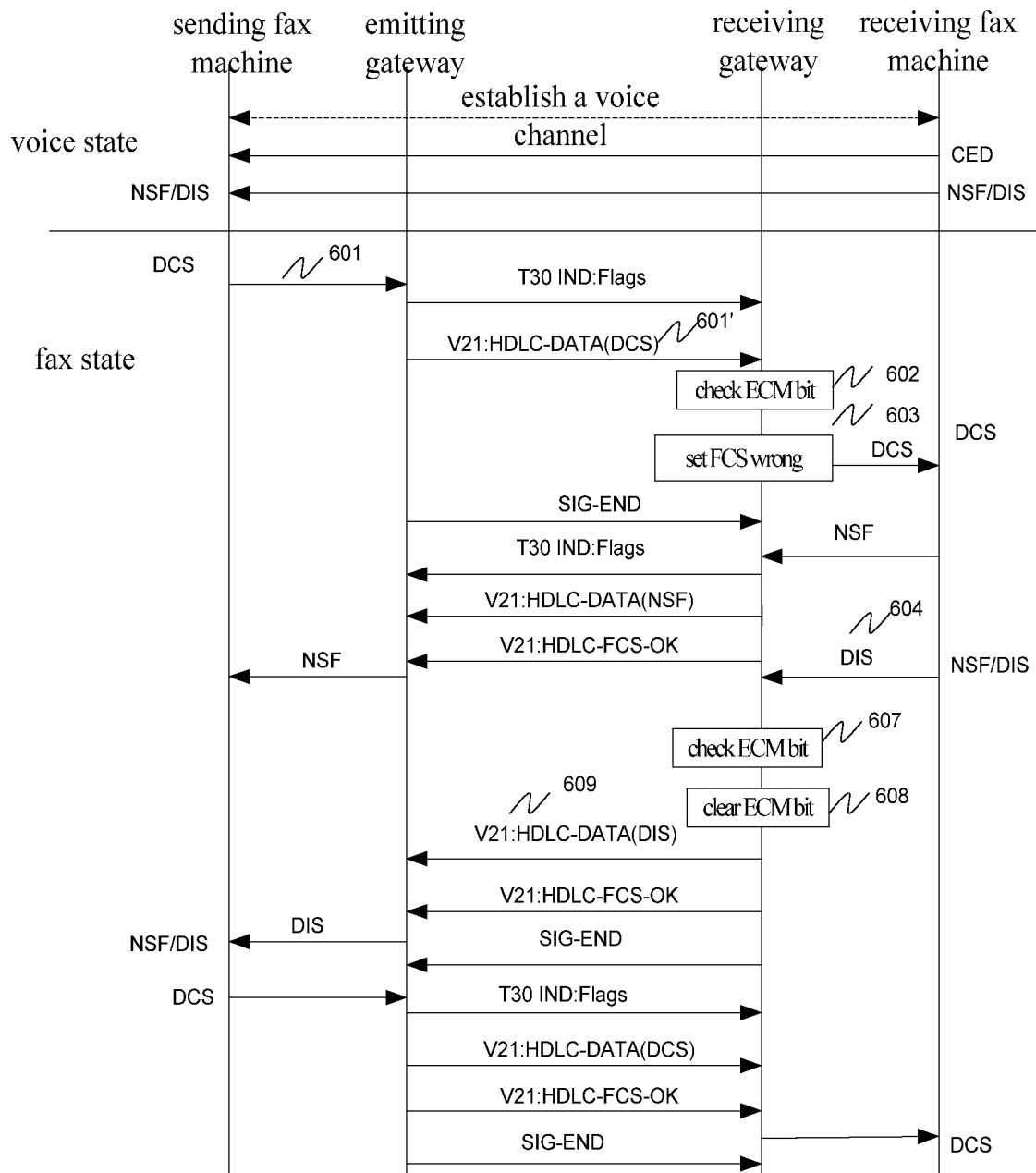


Figure 6

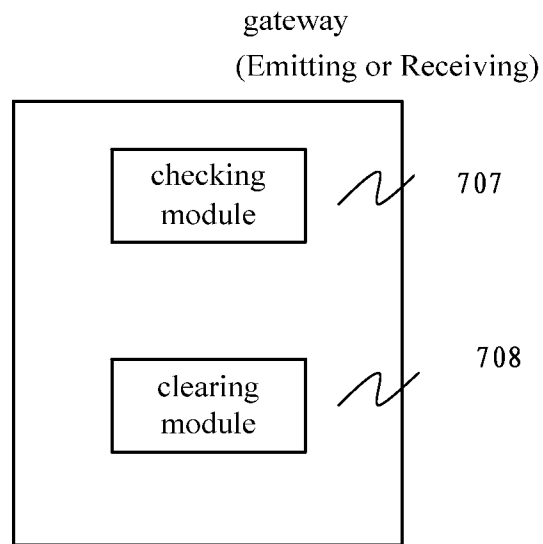


Figure 7

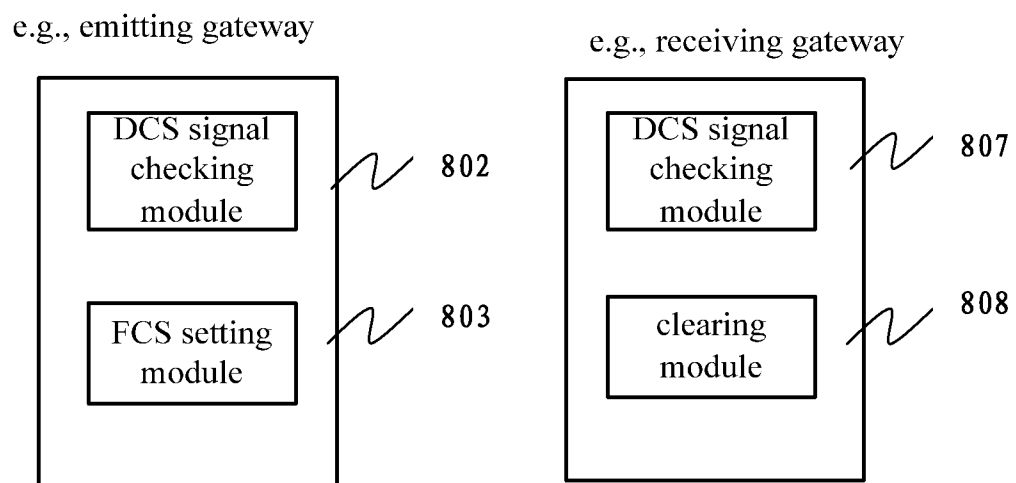


Figure 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/001760

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N1/00 H04N1/327 H04L12/66
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2011 114839 A (NEC FIELDING LTD) 9 June 2011 (2011-06-09) paragraphs [0001], [0002], [0003], [0005], [0006], [0018] -----	1-15
X	CN 101 448 060 A (ZTE COMMUNICATION CO LTD) 3 June 2009 (2009-06-03) abstract page 4, line 1 - line 4 page 7, line 13 - page 8, line 2 page 8, line 20 - line 21 -----	1-15
A	EP 1 517 496 A1 (RICOH KK [JP]) 23 March 2005 (2005-03-23) abstract; figure 1 paragraphs [0003] - [0012] -----	1-15

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Further documents are listed in the continuation of Box C.

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See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 December 2013

Date of mailing of the international search report

20/12/2013

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Authorized officer

Veaux, Christophe

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2013/001760

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