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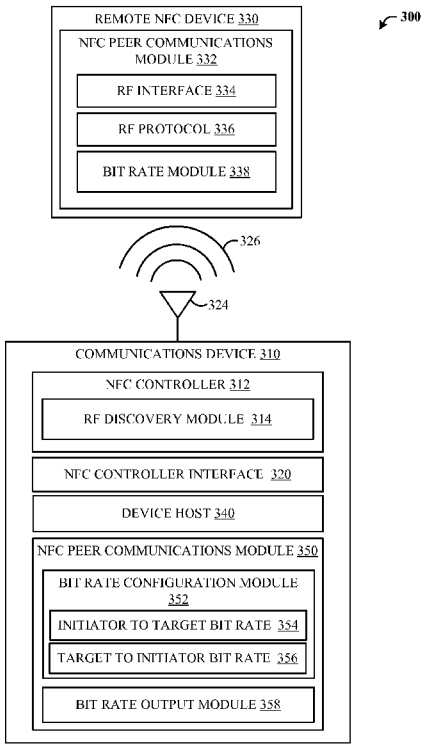

FIG. 3

(57) Abstract: Aspects disclosed herein relate to enabling specification of different bit rates in each direction for NFC peer communications. In one example, a target NFC device may be configured to receive a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used in the other direction, and to function in either a first or a second target sub-state based on the first bit rate value. In another example, an initiator NFC device may be configured to determine a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used in the other direction, and to transmit the first and second bit rate values in a parameter selection request message.

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METHODS AND APPARATUS FOR IMPROVING PEER COMMUNICATIONS USING AN ACTIVE COMMUNICATION MODE

Claim of Priority under 35 U.S.C. §119

[0001] The present Application for Patent claims priority to Provisional Application No. 61/622,292 entitled "METHODS AND APPARATUS FOR IMPROVING PEER COMMUNICATIONS USING AN ACTIVE COMMUNICATION MODE" filed April 10, 2012, and assigned to the assignee hereof and hereby expressly incorporated by reference herein.

BACKGROUND

[0002] The disclosed aspects relate generally to communications between and/or within devices and specifically to methods and systems for improving peer communications through allowing use of different bit rates from a target near field communication (NFC) device and an initiator NFC device and from a initiator NFC device to a target NFC device.

[0003] Advances in technology have resulted in smaller and more powerful personal computing devices. For example, there currently exist a variety of portable personal computing devices, including wireless computing devices, such as portable wireless telephones, personal digital assistants (PDAs) and paging devices that are each small, lightweight, and can be easily carried by users. More specifically, the portable wireless telephones, for example, further include cellular telephones that communicate voice and data packets over wireless networks. Many such cellular telephones are manufactured with ever increasing computing capabilities, and as such, are becoming tantamount to small personal computers and hand-held PDAs. Further, such devices are enabling communications using a variety of frequencies and applicable coverage areas, such as cellular communications, wireless local area network (WLAN) communications, NFC, etc.

[0004] NFC enabled devices may operation in a polling mode and/or a listening mode. As part of a device activation activity process associated with peer mode communications, an initiator NFC device may specify a bit rate. Version 1.0 of the NFC Forum Activity specification only includes a single parameter for configuring the

bit rate to be used in peer mode. As such, currently there is no way to configure a device to use different bit rates for each direction.

[0005] Thus, improved apparatuses and methods for providing a mechanism to enable specification of different bit rates in each direction for peer communications may be desired.

SUMMARY

[0006] The following presents a summary of one or more aspects to provide a basic understanding of such aspects. This summary is not an extensive overview of all contemplated aspects, and is not intended to identify key or critical elements of all aspects nor delineate the scope of any or all aspects. Its purpose is to present some concepts of one or more aspects form as a prelude to the more detailed description presented later.

[0007] Various aspects are described in connection with enabling specification of different bit rates in each direction for peer communications. In one example, a target NFC device may be configured to receive a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used in the other direction. The target NFC device may be also configured to function in either a first or a second target sub-state based on the first bit rate value. In another example, an initiator NFC device may be configured to determine a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used in the other direction. The initiator NFC device may also be configured to transmit the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

[0008] According to related aspects, a method for enabling specification of different bit rates in each direction for peer communications is described. The method can include receiving, by a target NFC device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The method can also include functioning in either a first target sub-state or a second target sub-state based on the first bit rate value.

[0009] Another aspect relates to a communications apparatus. The communications apparatus can include means for receiving, by a target NFC device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The communications apparatus can also include means for functioning in either a first target sub-state or a second target sub-state based on the first bit rate value.

[0010] Another aspect relates to a communications apparatus. The apparatus can include a NFC peer mode communications module configured to receive a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The NFC peer mode communications module may be further configured to function in either a first target sub-state or a second target sub-state based on the first bit rate value.

[0011] Another aspect relates to a computer program product, which can have a computer-readable medium comprising code for receiving, by a target NFC device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The computer-readable medium can also include code for functioning in either a first target sub-state or a second target sub-state based on the first bit rate value.

[0012] According to related aspects, another method for enabling specification of different bit rates in each direction for peer communications is described. The method can include determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The method can also include transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

[0013] Another aspect relates to a communications apparatus. The communications apparatus can include means for determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The communications apparatus can also include means for

transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

[0014] Another aspect relates to a communications apparatus. The apparatus can include a NFC peer mode communications module configured to determine a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The NFC peer mode communications module may be further configured transmit the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

[0015] Another aspect relates to a computer program product, which can have a computer-readable medium comprising code for determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. The computer-readable medium can also include code for transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

[0016] To the accomplishment of the foregoing and related ends, the one or more aspects comprise features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative features of the one or more aspects. These features are indicative, however, of but a few of the various ways in which the principles of various aspects may be employed, and this description is intended to include all such aspects and their equivalents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The disclosed aspects will hereinafter be described in conjunction with the appended drawings, provided to illustrate and not to limit the disclosed aspects, wherein like designations denote like elements, and in which:

[0018] FIG. 1 is a block diagram of a wireless communication system, according to an aspect.

[0019] FIG. 2 is a schematic diagram of a wireless communication system, according to an aspect.

[0020] FIG. 3 is a block diagram of a NFC environment, according to an aspect;

[0021] FIG. 4 is a call flow diagram describing an example of using different bit rates in each direction for NFC peer mode communications, according to an aspect;

[0022] FIG. 5 is a flowchart describing an example of using different bit rates in each direction for NFC peer mode communications, according to an aspect;

[0023] FIG. 6 is a flowchart describing another example of using different bit rates in each direction for NFC peer mode communications, according to an aspect;

[0024] FIG. 7 is a function block diagram example architecture of a communications device, according to an aspect;

[0025] FIG. 8 is a block diagram of an example communication system for using different bit rates in each direction for NFC peer mode communications, according to an aspect; and

[0026] FIG. 9 is a block diagram of an example communication system for using different bit rates in each direction for NFC peer mode communications, according to an aspect.

DETAILED DESCRIPTION

[0027] Various aspects are now described with reference to the drawings. In the following description, for purposes of explanation, numerous specific details are set forth to provide a thorough understanding of one or more aspects. It should be understood, however, that such aspect(s) may be practiced without these specific details.

[0028] Generally, a device may recognize a NFC target device and/or tag when within range of the coverage area of the NFC device and/or tag. Thereafter, the device may obtain sufficient information to allow for communications to be established. One form of communications that may be established is a peer-to-peer communications link. As described herein, an initiator NFC device may be configured to indicate to a target NFC device that different bit rates may be used in each direction for NFC peer mode communications.

[0029] **FIG. 1** illustrates a wireless communication system 100, in accordance with various exemplary embodiments of the present invention. Input power 102 is provided to a transmitter 104 for generating a radiated field 106 for providing energy transfer. A receiver 108 couples to the radiated field 106 and generates an output power 110 for storing or consumption by a device (not shown) coupled to the output power 110. Both the transmitter 104 and the receiver 108 are separated by a distance 112. In an

exemplary embodiment, transmitter 104 and receiver 108 are configured according to a mutual resonant relationship and when the resonant frequency of receiver 108 and the resonant frequency of transmitter 104 are very close, transmission losses between the transmitter 104 and the receiver 108 are minimal when the receiver 108 is located in the "near-field" of the radiated field 106.

[0030] Transmitter 104 further includes a transmit antenna 114 for providing a means for energy transmission. A receiver 108 includes a receive antenna 118 as a means for energy reception. The transmit and receive antennas are sized according to applications and devices associated therewith. As stated, an efficient energy transfer occurs by coupling a large portion of the energy in the near-field of the transmitting antenna to a receiving antenna rather than propagating most of the energy in an electromagnetic wave to the far field. When in this near-field a coupling mode may be developed between the transmit antenna 114 and the receive antenna 118. The area around the antennas 114 and 118 where this near-field coupling may occur is referred to herein as a coupling-mode region.

[0031] FIG. 2 is a schematic diagram of an example near field wireless communication system. The transmitter 204 includes an oscillator 222, a power amplifier 224 and a filter and matching circuit 226. The oscillator is configured to generate a signal at a desired frequency, which may be adjusted in response to adjustment signal 223. The oscillator signal may be amplified by the power amplifier 224 with an amplification amount responsive to control signal 225. The filter and matching circuit 226 may be included to filter out harmonics or other unwanted frequencies and match the impedance of the transmitter 204 to the transmit antenna 214.

[0032] The receiver 208 may include a matching circuit 232 and a rectifier and switching circuit 234 to generate a DC power output to charge a battery 236 as shown in FIG. 2 or power a device coupled to the receiver (not shown). The matching circuit 232 may be included to match the impedance of the receiver 208 to the receive antenna 218. The receiver 208 and transmitter 204 may communicate on a separate communication channel 219 (e.g., Bluetooth, zigbee, cellular, etc).

[0033] The receiver 208 may include a matching circuit 232 and a rectifier and switching circuit 234 to generate a DC power output to charge a battery 236 as shown in FIG. 2 or power a device coupled to the receiver (not shown). The matching circuit 232 may be included to match the impedance of the receiver 208 to the receive antenna 218.

The receiver 208 and transmitter 204 may communicate on a separate communication channel 119 (e.g., Bluetooth, zigbee, cellular, etc).

[0034] With reference to **FIG. 3**, a block diagram of a communication network 300 according to an aspect is illustrated. Communication network 300 may include communications device 310 which, through antenna 324, may be in communication with a remote NFC device 330 using one or more NFC technologies 326 (e.g., NFC-A, NFC-B, NFC-F, etc.). In an aspect, remote NFC device 330 and/or communications device 310 may be operable to communicate through NFC peer mode communications module 332 through one or more RF interfaces 334 using one or more RF protocols 336. Further, NFC peer mode communications module 332 may include bit rate module 338 that is operable to determine a bit rate for use for communications from communications device 310 and for communications to communications device 310. In an aspect, bit rate module 338 may be provided with different bit rates values for use in each direction for NFC peer mode communications. In another aspect, communications device 310 may be operable to be connected to an access network and/or core network (e.g., a CDMA network, a GPRS network, a UMTS network, and other types of wireline and wireless communication networks). In an aspect, remote NFC device 330 may include but is not limited to a remote NFC tag, a reader/writer device, a peer initiator device, a remote peer target device, etc.

[0035] Communications device 310 may include NCI 320. In an aspect, NCI 320 may be operable to enable communications between a NFC enabled antenna and NFC controller 312. NCI 320 may be operable to function in a listening mode and/or a polling mode. During passive communication mode communications, whichever mode the communications device 310 begins peer communications as is the mode that the communications device 310 may remain for the duration of the peer communications. During active communication mode communications, communications device 310 may switch listening mode and polling mode responsibilities during a peer communications link.

[0036] Communications device 310 may include a NFC controller (NFCC) 312. In an aspect, NFCC 312 may include RF discovery module 314. RF discovery module 314 may be operable to perform RF discovery using a RF discovery loop as part of a discovery process to enable peer mode communications. DH 340 may be operable to

generate a command to prompt NFCC 312 to perform various functions associated with RF discovery.

[0037] Communications device 310 may include NFC peer communications module 350. NFC peer communications module 350 may be operable to enable various modes and/or configurations for peer communications. In an aspect, NFC peer communications module 350 may include bit rate configuration module 352 that may be operable to configure peer mode communications in which different bit rates may be used in each direction. In an aspect, bit rate configuration module 352 may configure an initiator to target bit rate 354 and a target to initiator bit rate 356. In an aspect, the initiator to target bit rate 354 may be the same as the target to initiator bit rate 356. In another aspect, bit rate configuration module 352 may configure the target bit rate 354 and target to initiator bit rate 356 with a value that prompts communications device (e.g., 310, 330) to maintain a current (e.g., default bit rate). For example, where a communications device is in a ready state to support NFC-F RF technology based communications, a default value of 424 kilobits per second (kbps) may be used. In another aspect, bit rate configuration module 352 may configure the target bit rate 354 and target to initiator bit rate 356 with values that prompt communications device (e.g., 310, 330) to use one or a plurality of bit rate options. For example, the different bit rate options may include, but are not limited to, 106 kbps, 212, kbps, 424 kbps, etc. Table 1 provides example configure parameters used during device activation.

Name	Format	Size	Description
CON_ATR	Hexadecimal	3 Bytes	ATR_REQ Command parameter • Refer to [DIGITAL] (Byte 13 of ATR_REQ) for the coding of Byte 1. • Refer to [DIGITAL] (Byte 14 of ATR_REQ) for the coding of Byte 2. • Refer to [DIGITAL] (Byte 15 of ATR_REQ) for the coding of Byte 3. • Refer to [DIGITAL] (Byte 16 of ATR_REQ) for the coding of Byte 4.
CON_GB	Hexadecimal	n Bytes	General bytes of the ATR_REQ or Higher Layer INF of ATTRIB Refer to [DIGITAL] Byte 17+n of ATR_REQ and [DIGITAL] Byte 10+n for ATTRIB. For the ATR_REQ, these bytes contain the General Bytes (G_T0...G_Tn) as information for LLCP. For ATTRIB, these bytes contain High Layer INF.
CON_RATS	Hexadecimal	1 Byte	RATS Command Parameters Refer to [DIGITAL] (Byte 2 of RATS Command) for the coding of Byte 1.
CON_ATTRIB	hexadecimal	3 Bytes	ATTRIB Command Parameters • Refer to [DIGITAL] (Byte 6 of ATTRIB Command) for the coding of Byte 1. • Refer to [DIGITAL] (Byte 7 of ATTRIB Command) for the coding of Byte 2. • Refer to [DIGITAL] (Byte 8 of ATTRIB Command) for the coding of Byte 3. • Refer to [DIGITAL] (Byte

Name	Format	Size	Description
			9 of ATTRIB Command) for the coding of Byte 4.
CON_BITR_NFC_DEP_I2T	Integer	1 Byte	Desired Bit rate for NFC-DEP in the direction from Initiator to Target • 0: maintain the bit rate • 1: 106 kbps • 2: 212 kbps • 3: 424 kbps
CON_BITR_NFC_DEP_T2I	Integer	1 Byte	Desired Bit rate for NFC-DEP in the direction from Target to Initiator • 0: maintain the bit rate • 1: 106 kbps • 2: 212 kbps • 3: 424 kbps

Table 1: Device Activation Activity – Configuration Parameters

[0038] As seen in Table 1, different bit rates may be configured for each direction of communications. An initiator to target bit rate 354 may be indicated using the CON_BITR_NFC_DEP_I2T parameter and a target to initiator bit rate 346 may be indicated using the CON_BITR_NFC_DEP_T2I parameter.

[0039] NFC peer communications module 350 may use the initiator to target bit rate 354 and target to initiator bit rate 356 values as parameters in a parameter selection request message. For example, the initiator to target bit rate 354 may be used as a data rate send by initiator (DSI) value and the target to initiator bit rate 356 may be used as a data rate received by initiator (DRI) value in the parameter selection request (e.g., PSL_REQ) message.

[0040] In one aspect in which a communications device (e.g., 310, 330) was previously operable to use NFC-A RF technology, DSI and DRI may be calculated from the initiator to target bit rate 354 and target to initiator bit rate 356 parameters as follows. When initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to either 0 or 1, then the NFC peer communications module 350 sets DSI equal to 000b. Further, when initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to 2, then the NFC peer communications module 350 sets DSI equal to 001b.

Additionally, when initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to or larger than 3, then the NFC peer communications module 350 sets DSI equal to 010b. Similarly, when target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to either 0 or 1, then the NFC peer communications module 350 sets DRI equal to 000b. When target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to 2, then the NFC peer communications module 350 sets DRI equal to 001b. When target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to or larger than 3, then the NFC peer communications module 350 set DRI equal to 010b.

[0041] In one aspect in which a communications device (e.g., 310, 330) was previously operable to use NFC-F RF technology, DSI and DRI may be calculated from the initiator to target bit rate 354 and target to initiator bit rate 356 parameters as follows. When initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to 0, then the NFC peer communications module 350 sets DSI equal to the current Bit rate. When initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to 1, then the NFC peer communications module 350 sets DSI equal to 000b. When initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to 2, then the NFC peer communications module 350 sets DSI equal to 001b. When initiator to target bit rate 354 (e.g., CON_BITR_NFC_DEP_I2T) is equal to or larger than 3, then the NFC peer communications module 350 sets DSI equal to 010b. When target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to 0, then the NFC peer communications module 350 sets DRI equal to the current Bit rate. When target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to 1, then the NFC peer communications module 350 sets DRI equal to 000b. When target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to 2, then the NFC peer communications module 350 sets DRI equal to 001b. When target to initiator bit rate 356 (e.g., CON_BITR_NFC_DEP_T2I) is equal to or larger than 3, then the NFC peer communications module 350 sets DRI equal to 010b.

[0042] In an aspect, bit rate configuration module 352 may further be configured to use various profile configurations for various aspects associated with NFC related actions. For example, Table 2 describes configuration parameters that may be used for peer-to-peer (P2P) polling. In such an aspect, the technology detection process may use a speed of 424kbit/s for NFC-F in both directions. In another example of profile configuration

parameters, Table 3 provides configuration parameters that may be used during NFC Data Exchange format (NDEF) polling. In another example of profile configuration parameters, Table 4 provides configuration parameters that may be used during P2PNDEF polling.

Parameter	P2P
CON_POLL_A	0b
CON_POLL_B	0b
CON_POLL_F	1b
CON_POLL_P	0b
CON_BAIL_OUT_A	0b
CON_BAIL_OUT_B	0b
CON_DEVICES_LIMIT	01h
CON_ADV_FEAT	0b
CON_ATR	As defined in [DIGITAL]
CON_GB	LLCP Parameters
CON_RATS	NA
CON_ATTRIB	NA
CON_BITR_NFC_DEP_I2T	3
CON_BITR_NFC_DEP_T2I	3

Table 2: P2P Poll Profile Configuration Parameters

Parameter	NDEF
CON_POLL_A	1b
CON_POLL_B	1b
CON_POLL_F	1b
CON_POLL_P	0b
CON_BAIL_OUT_A	0b
CON_BAIL_OUT_B	0b
CON_DEVICES_LIMIT	04h
CON_ADV_FEAT	0b
CON_ATR	NA
CON_GB	None
CON_RATS	As defined in [DIGITAL]
CON_ATTRIB	As defined in [DIGITAL]
CON_BITR_NFC_DEP_I2T	0
CON_BITR_NFC_DEP_T2I	0

Table 3: NDEF Poll Profile Configuration Parameters

Parameter	NDEF
CON_POLL_A	1b
CON_POLL_B	1b
CON_POLL_F	1b
CON_POLL_P	0b
CON_BAIL_OUT_A	0b
CON_BAIL_OUT_B	0b
CON_DEVICES_LIMIT	04h
CON_ADV_FEAT	0b
CON_ATR	As defined in [DIGITAL]
CON_GB	LLCP Parameters
CON_RATS	As defined in [DIGITAL]
CON_ATTRIB	As defined in [DIGITAL]
CON_BITR_NFC_DEP_I2T	3
CON_BITR_NFC_DEP_T2I	3

Table 4: P2PNDEF Poll Profile Configuration Parameters

[0043] In another aspect, NFC peer communications module 350 may further include bit rate output module 358 that may be operable to provide the target bit rate 354 and target to initiator bit rate 356 values for use in one or more other communication

establishment processes (e.g., a resolution process). Table 5 provides example output parameter values generated during device activation.

Name	Format	Size	Description
INT_INDEX	Integer	1 Byte	Index to the identifier of the device activated
INT_DX_BIT_RATE_I2T	Integer	1 Byte	Current Bitrate in case of NFC_DEP activation in the direction from Initiator to Target: • 0: maintain bit rate • 1: 106 kbps • 2: 212 kbps • 3: 424 kbps
INT_DX_BIT_RATE_T2I	Integer	1 Byte	Current Bitrate in case of NFC_DEP activation in the direction from Target to Initiator: • 0: maintain bit rate • 1: 106 kbps • 2: 212 kbps • 3: 424 kbps

Table 5: Device Activation Activity – Output Parameters

[0044] As seen in Table 5, initiator to target bit rate 354 may be indicated using the INT_DX_BIT_RATE_I2T parameter and a target to initiator bit rate 346 may be indicated using the INT_DX_BIT_RATE_T2I parameter. In an aspect, the bit rate output module 358 may handle the PSL_REQ Response. In such an aspect, when a Valid PSL_RES Response is received, the bit rate output module 358 sets INT_DX_BIT_RATE_I2T according to the bit rate specified by the DSI parameter of PSL_REQ, and sets INT_DX_BIT_RATE_T2I according to the bit rate specified by the DRI parameter of PSL_REQ.

[0045] In operation, communications device 310 may transmit the parameter selection request message to a remote NFC device 330. Based at least in part on the DSI value included in the parameter selection request message, the remote NFC device 330 may determine which NFC RF technology may be used for peer communications. For example, in an aspect, where the remote NFC device 330 is in a ready state for NFC-A based communications, and the DSI value is set to a zero value (e.g., 000b), then the remote NFC device 330 maintains a ready state for NFC-A based peer communications.

In another example aspect, where the remote NFC device 330 is in a ready state for NFC-A based communications, and the DSI value is set to a non-zero value (e.g., 001b, 010b), then the remote NFC device 330 may switch from a NFC-A ready state to a NFC-F ready state. In still another aspect, where the remote NFC device 330 is in a ready state for NFC-F based communications, and the DSI value is set to a zero value (e.g., 000b), then the remote NFC device 330 may switch from a NFC-F ready state to a NFC-A ready state. In another example aspect, where the remote NFC device 330 is in a ready state for NFC-F based communications, and the DSI value is set to a non-zero value (e.g., 001b, 010b), then the remote NFC device 330 maintains a ready state for NFC-F based peer communications.

[0046] Continuing the above operational aspect, remote NFC device 330 may respond to the parameter selection request message with a response indicating successful receipt of the parameter selection request message. Thereafter, communications device 310 bit rate output module 358 may indicate the target bit rate 354 and target to initiator bit rate 356 values as outputs associated with a device activation process.

[0047] Therefore, a system and method is disclosed to provide peer communications between communications device 310 and remote NFC device 330 in which different bit rate may be used in each direction.

[0048] FIGs. 4-6 illustrate various methodologies in accordance with various aspects of the presented subject matter. While, for purposes of simplicity of explanation, the methodologies are shown and described as a series of acts or sequence steps, it is to be understood and appreciated that the claimed subject matter is not limited by the order of acts, as some acts may occur in different orders and/or concurrently with other acts from that shown and described herein. For example, those skilled in the art will understand and appreciate that a methodology could alternatively be represented as a series of interrelated states or events, such as in a state diagram. Moreover, not all illustrated acts may be required to implement a methodology in accordance with the claimed subject matter. Additionally, it should be further appreciated that the methodologies disclosed hereinafter and throughout this specification are capable of being stored on an article of manufacture to facilitate transporting and transferring such methodologies to computers. The term article of manufacture, as used herein, is intended to encompass a computer program accessible from any computer-readable device, carrier, or media.

[0049] FIG. 4 depicts a call flow diagram conceptually illustrating communications between an initiator NFC device 402 and a target NFC device 404 a communications environment 400, according to an aspect. Communications environment 400 may include initiator NFC device 402 and target NFC device 404.

[0050] At act 406, initiator NFC device may configure one or more parameters associated with establishment of peer mode communications. In an aspect, initiator NFC device may configure different bit rate values to be used in each direction detect of communications during peer mode communications. As described above, an initiator to target bit rate may be indicated using the CON_BITR_NFC_DEP_I2T parameter and a target to initiator bit rate may be indicated using the CON_BITR_NFC_DEP_T2I parameter. Further configuration parameters are provided in Table 1 above.

[0051] At act 408, initiator NFC device may transmit a parameter selection request message to a target NFC device as part of establishment of a peer communication link. In an aspect, the target bit rate configured at act 406 may be used as a data rate send by initiator (DSI) value and the target to initiator bit rate configured at act 406 may be used as a data rate received by initiator (DRI) value in the parameter selection request (e.g., PSL_REQ) message.

[0052] At act 410, the target NFC device may interpret the parameter selection request message. In an aspect, the target NFC device may modify one or more configurations based on information in the received parameter selection request message. For example, in an aspect, where the target NFC device 404 is in a ready state for NFC-A based communications, and the DSI value is set to a zero value (e.g., 000b), then the target NFC device 404 may maintain a ready state for NFC-A based peer communications. In another example aspect, where the target NFC device 404 is in a ready state for NFC-A based communications, and the DSI value is set to a non-zero value (e.g., 001b, 010b), then the target NFC device 404 may change from a NFC-A ready state to a NFC-F ready state. In another example aspect, where the target NFC device 404 is in a ready state for NFC-A based communications, and the DSI value is set to a zero value (e.g., 000), then the target NFC device 404 may maintain a NFC-A ready state for communications uses NFC-A technology in the direction from Initiator to Target. In still another aspect, where the target NFC device 404 is in a ready state for NFC-F based communications, and the DSI value is set to a zero value (e.g., 000b), then target NFC device 404 may switch from a NFC-F ready state to a NFC-A ready state.

In another example aspect, where the target NFC device 404 is in a ready state for NFC-F based communications, and the DSI value is set to a non-zero value (e.g., 001b, 010b), then the target NFC device 404 may maintain a ready state for NFC-F based peer communications.

[0053] At act 412, the target NFC device 404 transmits a parameter selection response message to the initiator NFC device 402.

[0054] At act 414, the initiator NFC device 402 may generate one or more output values after receipt of the parameter selection response. Examples of output parameters are provided in able 2 above.

[0055] FIG. 5 depicts a flowchart describing an example process 500 in which different bit rates may be used in each direction for NFC peer mode communications.

[0056] At block 502, a target NFC device may receive a parameter selection request message. In an aspect, the parameter selection request message may include a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. In an aspect, the first bit rate value and the second bit rate value may be a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, a value indicating 424 kbps, etc. In another aspect, the first bit rate value may be a data rate send by the initiator (DSI) value, and the second bit rate value may be a data rate receive to initiator (DRI) value in a parameter selection request (PSL_REQ) message.

[0057] At block 504, the target NFC device may determine whether to change a ready sub-state based on the received message. Where the target NFC device is in a ready state for NFC-A based communications, and the DSI value is set to a zero value (e.g., 000b), then at block 506, the target NFC device may maintain a ready state for NFC-A based peer communications. Further, where the target NFC device is in a ready state for NFC-A based communications, and the DSI value is set to a non-zero value (e.g., 001b, 010b), then at block 508, the target NFC device may change from a NFC-A ready state to a NFC-F ready state. In another aspect, where the target NFC device is in a ready state for NFC-F based communications, and the DSI value is set to a zero value (e.g., 000b), then at block 508, target NFC device may switch from a NFC-F ready state to a NFC-A ready state. Further, where the target NFC device is in a ready state for NFC-F based communications, and the DSI value is set to a non-zero value (e.g., 001b, 010b),

then at block 506, the target NFC device may maintain a ready state for NFC-F based peer communications.

[0058] At block 510, the target NFC device may transmit a parameter selection response (e.g., PSL_RES) message indicating successful receipt of the PSL_RQ message.

[0059] In an optional aspect, at block 512, based on the values received in the PSL_REQ message, the target NFC device and the initiator NFC device may perform peer mode communications using the first bit rate for transmissions from the initiator NFC device to the target NFC device and a second bit rate for transmissions from the target NFC device to the initiator NFC device.

[0060] **FIG. 6** depicts a flowchart describing another example process 600 in which different bit rates may be used in each direction for NFC peer mode communications.

[0061] At block 602, an initiator NFC device determine a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device. In an aspect, the first bit rate value and the second bit rate value may be a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, a value indicating 424 kbps, etc.

[0062] At block 604, the initiator NFC device may transmit the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message. In another aspect, the first bit rate value may be a data rate send by the initiator (DSI) value, and the second bit rate value may be a data rate receive to initiator (DRI) value in the parameter selection request (PSL_REQ) command.

[0063] In an optional aspect, at block 606, the initiator NFC device may receive a parameter selection response (e.g. PSL_RES) from the target NFC device.

[0064] In another optional aspect, the initiator NFC device may generate a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value.

[0065] In such an optional aspect, at block 610, the generated output parameters may be provided for use in one or more other processes associated with establishment of peer mode communications (e.g., a resolution process).

[0066] While referencing FIG. 3, but turning also now to **FIG. 7**, an example architecture of communications device 700 is illustrated. As depicted in FIG. 7, communications device 700 comprises receiver 702 that receives a signal from, for instance, a receive antenna (not shown), performs typical actions on (e.g., filters, amplifies, downconverts, etc.) the received signal, and digitizes the conditioned signal to obtain samples. Receiver 702 can comprise a demodulator 704 that can demodulate received symbols and provide them to processor 706 for channel estimation. Processor 706 can be a processor dedicated to analyzing information received by receiver 702 and/or generating information for transmission by transmitter 720, a processor that controls one or more components of communications device 700, and/or a processor that both analyzes information received by receiver 702, generates information for transmission by transmitter 720, and controls one or more components of communications device 700. Further, signals may be prepared for transmission by transmitter 720 through modulator 718 which may modulate the signals processed by processor 706.

[0067] Communications device 700 can additionally comprise memory 708 that is operatively coupled to various components, such as but not limited processor 706 and that can store data to be transmitted, received data, information related to available channels, TCP flows, data associated with analyzed signal and/or interference strength, information related to an assigned channel, power, rate, or the like, and any other suitable information for assisting in NFC peer mode connection establishment.

[0068] Further, processor 706, device host 734, NFCC 730, and/or NFC peer communications module 760 can provide means for receiving a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device, and means for functioning in either a first target sub-state or a second target sub-state based on the first bit rate value. The first target sub-state may be associated with peer communications based on a first NFC RF technology. The second target sub-state may be associated with peer communications based on a second NFC RF technology.

[0069] Still further, processor 706, device host 734, NFCC 730, and/or NFC peer communications module 760 can provide means for determining a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a

second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device, and means for transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

[0070] It will be appreciated that data store (e.g., memory 708) described herein can be either volatile memory or nonvolatile memory, or can include both volatile and nonvolatile memory. By way of illustration, and not limitation, nonvolatile memory can include read only memory (ROM), programmable ROM (PROM), electrically programmable ROM (EPROM), electrically erasable PROM (EEPROM), or flash memory. Volatile memory can include random access memory (RAM), which acts as external cache memory. By way of illustration and not limitation, RAM is available in many forms such as synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), enhanced SDRAM (ESDRAM), Synchlink DRAM (SLDRAM), and direct Rambus RAM (DRRAM). Memory 708 of the subject systems and methods may comprise, without being limited to, these and any other suitable types of memory.

[0071] Communications device 700 may include a NFC controller 730. In an aspect, NFCC 730 may include RF discovery module 732. RF discovery module 732 may be operable to perform RF discovery using a RF discovery loop (e.g., 710) as part of a discovery process to enable peer mode communications. DH 734 may be operable to generate a command to prompt NFCC 730 to perform various NFC actions, such as but not limited to, RF discovery, etc.

[0072] In another aspect, communications device 700 may include NCI 750. In an aspect, NCI 750 may be operable to enable communications between a NFC enabled antenna (e.g., 702, 720), NFC controller 730 and DH 734. NCI 750 may be operable to function in a listening mode and/or a polling mode. During passive communication mode communications, whichever mode the communications device 700 begins peer communications as is the mode that the communications device 700 may remain for the duration of the peer communications. During active communication mode communications, communications device 700 may switch listening mode and polling mode responsibilities during a peer communications link.

[0073] In another aspect, communications device 700 may include NFC peer communications module 760. NFC peer communications module 760 may be operable to enable various modes and/or configurations for peer communications. In an aspect,

NFC peer communications module 760 may include bit rate configuration module 762 that may be operable to configure peer mode communications in which different bit rates may be used in each direction. In an aspect, bit rate configuration module 762 may configure an initiator to target bit rate 764 and a target to initiator bit rate 766. In an aspect, the initiator to target bit rate 764 may be the same as the target to initiator bit rate 766. In another aspect, bit rate configuration module 762 may configure the target bit rate 764 and target to initiator bit rate 766 with a value that prompts communications device 700 to maintain a current (e.g., default bit rate). For example, where a communications device is in a ready state to support NFC-F RF technology based communications, a default value of 424 kilobits per second (kbps) may be used. In another aspect, bit rate configuration module 762 may configure the target bit rate 764 and target to initiator bit rate 766 with values that prompt communications device 700 to use one or a plurality of bit rate options. For example, the different bit rate options may include, but are not limited to, 106 kbps, 212, kbps, 424 kbps, etc.

[0074] In an aspect, NFC peer communications module 760 may include bit rate module 770 that may be operable to determine a bit rate for use for communications from an initiator NFC device and for communications to the initiator NFC device. In an aspect, bit rate module 770 may be provided with different bit rates values for use in each direction for NFC peer mode communications.

[0075] In another aspect, NFC peer communications module 760 may be operable to perform any of the one or more processes described with respect to FIGs. 4-6.

[0076] Additionally, communications device 700 may include user interface 740. User interface 740 may include input mechanisms 742 for generating inputs into communications device 700, and output mechanism 744 for generating information for consumption by the user of the communications device 700. For example, input mechanism 742 may include a mechanism such as a key or keyboard, a mouse, a touch-screen display, a microphone, etc. Further, for example, output mechanism 744 may include a display, an audio speaker, a haptic feedback mechanism, etc. In the illustrated aspects, the output mechanism 744 may include a display operable to present media content that is in image or video format or an audio speaker to present media content that is in an audio format.

[0077] FIG. 8 depicts a block diagram of an exemplary communication system 800 operable to enable specification of different bit rates in each direction for NFC peer

communications, according to an aspect. For example, system 800 can reside at least partially within a communications device (e.g., communications device 700). It is to be appreciated that system 800 is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System 800 includes a logical grouping 802 of electrical components that can act in conjunction.

[0078] For instance, logical grouping 802 can include an electrical component that may provide means for receiving, by a target NFC device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device 804. In an aspect, the first bit rate value and the second bit rate value each may include a bit rate value such as but not limited to a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, a value indicating 424 kbps, etc. In another aspect, the first bit rate value may be a DSI value, and the second bit rate value may be a DRI value.

[0079] Further, logical grouping 802 can include an electrical component that may provide means for functioning in either a first target sub-state or a second target sub-state based on the first bit rate value 806. In an aspect, the first target sub-state may be associated with peer communications based on a first NFC RF technology and the second target sub-state may be associated with peer communications based on a second NFC RF technology. In another aspect, the first target sub-state and the second target sub-state may each be a sub-state such as but not limited to a TARGET_A sub-state, a TARGET_F sub-state, etc. In such an aspect, TARGET_A sub-state may be associated with peer communications based on a NFC-A RF technology, and TARGET_F sub-state may be associated with peer communications based on a NFC-F RF technology.

[0080] Moreover, in an optional aspect, logical grouping 802 can include an electrical component that may provide means for transmitting a parameter selection response (e.g., PSL_REQ) to the initiator NFC device 808. In an aspect, the parameter selection response message may be transmitted in response to receipt of a parameter selection request (e.g., PSL_REQ) message from the initiator NFC device.

[0081] Additionally, system 800 can include a memory 810 that retains instructions for executing functions associated with the electrical components 804, 806, and 808, stores

data used or obtained by the electrical components 804, 806, 808, etc. While shown as being external to memory 810, it is to be understood that one or more of the electrical components 804, 806, and 808 may exist within memory 810. In one example, electrical components 804, 806, and 808 can include at least one processor, or each electrical component 804, 806, and 808 can be a corresponding module of at least one processor. Moreover, in an additional or alternative example, electrical components 804, 806, and 808 may be a computer program product including a computer readable medium, where each electrical component 804, 806, and 808 may correspond to code.

[0082] FIG. 9 depicts a block diagram of an exemplary communication system 900 operable to enable specification of different bit rates in each direction for NFC peer communications, according to an aspect. For example, system 900 can reside at least partially within a communications device (e.g., communications device 700). It is to be appreciated that system 900 is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System 900 includes a logical grouping 902 of electrical components that can act in conjunction.

[0083] For instance, logical grouping 902 can include an electrical component that may provide means for determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device 904. In an aspect, the first bit rate value and the second bit rate value each may include a bit rate value such as but not limited to a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, a value indicating 424 kbps, etc. In another aspect, the first bit rate value may be a DSI value, and the second bit rate value may be a DRI value.

[0084] Further, logical grouping 902 can include an electrical component that may provide means for transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request (e.g., PSL_REQ) message 906.

[0085] Further, in an optional aspect, logical grouping 902 can include an electrical component that may provide means for receiving a parameter selection response (e.g., PSL_REQ) from the target NFC device indicating successful reception of the parameter selection request message 908. In an aspect, the parameter selection response message

may be transmitted in response to receipt of the transmitted parameter selection request (e.g., PSL_REQ) message from the initiator NFC device.

[0086] Moreover, in another optional aspect, logical grouping 902 can include an electrical component that may provide means for generating a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value 910. In such an aspect, the means for generating 910 may further include means for providing the first and second output parameters for use in a resolution process.

[0087] Additionally, system 900 can include a memory 912 that retains instructions for executing functions associated with the electrical components 904, 906, 908, and 910, stores data used or obtained by the electrical components 904, 906, 908, 910, etc. While shown as being external to memory 912, it is to be understood that one or more of the electrical components 904, 906, 908, and 910 may exist within memory 912. In one example, electrical components 904, 906, 908, and 910 can include at least one processor, or each electrical component 904, 906, 908, and 910 can be a corresponding module of at least one processor. Moreover, in an additional or alternative example, electrical components 904, 906, 908, and 910 may be a computer program product including a computer readable medium, where each electrical component 904, 906, 908, and 910 may correspond to code.

[0088] As used in this application, the terms "component," "module," "system" and the like are intended to include a computer-related entity, such as but not limited to hardware, firmware, a combination of hardware and software, software, or software in execution. For example, a component may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a computing device and the computing device can be a component. One or more components can reside within a process and/or thread of execution and a component may be localized on one computer and/or distributed between two or more computers. In addition, these components can execute from various computer readable media having various data structures stored thereon. The components may communicate by way of local and/or remote processes such as in accordance with a signal having one or

more data packets, such as data from one component interacting with another component in a local system, distributed system, and/or across a network such as the Internet with other systems by way of the signal.

[0089] Furthermore, various aspects are described herein in connection with a terminal, which can be a wired terminal or a wireless terminal. A terminal can also be called a system, device, subscriber unit, subscriber station, mobile station, mobile, mobile device, remote station, mobile equipment (ME), remote terminal, access terminal, user terminal, terminal, communications device, user agent, user device, or user equipment (UE). A wireless terminal may be a cellular telephone, a satellite phone, a cordless telephone, a Session Initiation Protocol (SIP) phone, a wireless local loop (WLL) station, a personal digital assistant (PDA), a handheld device having wireless connection capability, a computing device, or other processing devices connected to a wireless modem. Moreover, various aspects are described herein in connection with a base station. A base station may be utilized for communicating with wireless terminal(s) and may also be referred to as an access point, a Node B, or some other terminology.

[0090] Moreover, the term "or" is intended to mean an inclusive "or" rather than an exclusive "or." That is, unless specified otherwise, or clear from the context, the phrase "X employs A or B" is intended to mean any of the natural inclusive permutations. That is, the phrase "X employs A or B" is satisfied by any of the following instances: X employs A; X employs B; or X employs both A and B. In addition, the articles "a" and "an" as used in this application and the appended claims should generally be construed to mean "one or more" unless specified otherwise or clear from the context to be directed to a singular form.

[0091] The techniques described herein may be used for various wireless communication systems such as CDMA, TDMA, FDMA, OFDMA, SC-FDMA and other systems. The terms "system" and "network" are often used interchangeably. A CDMA system may implement a radio technology such as Universal Terrestrial Radio Access (UTRA), cdma2000, etc. UTRA includes Wideband-CDMA (W-CDMA) and other variants of CDMA. Further, cdma2000 covers IS-2000, IS-95 and IS-856 standards. A TDMA system may implement a radio technology such as Global System for Mobile Communications (GSM). An OFDMA system may implement a radio technology such as Evolved UTRA (E-UTRA), Ultra Mobile Broadband (UMB), IEEE

802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20, Flash-OFDMA, etc. UTRA and E-UTRA are part of Universal Mobile Telecommunication System (UMTS). 3GPP Long Term Evolution (LTE) is a release of UMTS that uses E-UTRA, which employs OFDMA on the downlink and SC-FDMA on the uplink. UTRA, E-UTRA, UMTS, LTE and GSM are described in documents from an organization named "3rd Generation Partnership Project" (3GPP). Additionally, cdma2000 and UMB are described in documents from an organization named "3rd Generation Partnership Project 2" (3GPP2). Further, such wireless communication systems may additionally include peer-to-peer (e.g., mobile-to-mobile) *ad hoc* network systems often using unpaired unlicensed spectrums, 802.xx wireless LAN, BLUETOOTH, near-field communications (NFC-A, NFC-B, NFC,-F, etc.), and any other short- or long- range, wireless communication techniques.

[0092] Various aspects or features will be presented in terms of systems that may include a number of devices, components, modules, and the like. It is to be understood and appreciated that the various systems may include additional devices, components, modules, etc. and/or may not include all of the devices, components, modules etc. discussed in connection with the figures. A combination of these approaches may also be used.

[0093] The various illustrative logics, logical blocks, modules, and circuits described in connection with the aspects disclosed herein may be implemented or performed with a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general-purpose processor may be a microprocessor, but, in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration. Additionally, at least one processor may comprise one or more modules operable to perform one or more of the steps and/or actions described above.

[0094] Further, the steps and/or actions of a method or algorithm described in connection with the aspects disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, a hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An example storage medium may be coupled to the processor, such that the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. Further, in some aspects, the processor and the storage medium may reside in an ASIC. Additionally, the ASIC may reside in a user terminal. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal. Additionally, in some aspects, the steps and/or actions of a method or algorithm may reside as one or any combination or set of codes and/or instructions on a machine readable medium and/or computer readable medium, which may be incorporated into a computer program product.

[0095] In one or more aspects, the functions described may be implemented in hardware, software, firmware, or any combination thereof. If implemented in software, the functions may be stored or transmitted as one or more instructions or code on a computer-readable medium. Computer-readable media includes both computer storage media and communication media including any medium that facilitates transfer of a computer program from one place to another. A storage medium may be any available media that can be accessed by a computer. By way of example, and not limitation, such computer-readable media can comprise RAM, ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium that can be used to carry or store desired program code in the form of instructions or data structures and that can be accessed by a computer. Also, any connection may be termed a computer-readable medium. For example, if software is transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair, digital subscriber line (DSL), or wireless technologies such as infrared, radio, and microwave, then the coaxial cable, fiber optic cable, twisted pair, DSL, or wireless technologies such as infrared, radio, and microwave are included in the definition of medium. Disk and disc, as used herein, includes compact disc (CD), laser disc, optical disc, digital versatile disc (DVD), floppy disk and blu-ray disc where

disks usually reproduce data magnetically, while discs usually reproduce data optically with lasers. Combinations of the above should also be included within the scope of computer-readable media.

[0096] While the foregoing disclosure discusses illustrative aspects and/or aspects, it should be noted that various changes and modifications could be made herein without departing from the scope of the described aspects and/or aspects as defined by the appended claims. Furthermore, although elements of the described aspects and/or aspects may be described or claimed in the singular, the plural is contemplated unless limitation to the singular is explicitly stated. Additionally, all or a portion of any aspect and/or aspect may be utilized with all or a portion of any other aspect and/or aspect, unless stated otherwise.

CLAIMS

1. A method of wireless communications, comprising:

receiving, by a target near field communication (NFC) device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

functioning in either a first target sub-state or a second target sub-state based on the first bit rate value, wherein the first target sub-state is associated with peer communications based on a first NFC radio frequency (RF) technology, and wherein the second target sub-state is associated with peer communications based on a second NFC RF technology.

2. The method of claim 1, further comprising transmitting a parameter selection response to the initiator NFC device.

3. The method of claim 1, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

4. The method of claim 1, wherein the first target sub-state and the second target sub-state are each a sub-state from among: a TARGET_A sub-state or a TARGET_F sub-state, wherein the TARGET_A sub-state is associated with peer communications based on a NFC-A RF technology, and wherein the TARGET_F sub-state is associated with peer communications based on a NFC-F RF technology.

5. The method of claim 1, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

6. A method of wireless communications, comprising:

determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

7. The method of claim 6, further comprising receiving a parameter selection response from the target NFC device indicating successful reception of the parameter selection request message.

8. The method of claim 6, further comprising:

generating a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value; and

providing the first and second output parameters for use in a resolution process.

9. The method of claim 6, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

10. The method of claim 6, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

11. A computer program product, comprising:

a computer-readable medium comprising code for:

receiving, by a target near field communication (NFC) device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

functioning in either a first target sub-state or a second target sub-state based on the first bit rate value, wherein the first target sub-state is associated with peer communications based on a first NFC radio frequency (RF) technology, and wherein the second target sub-state is associated with peer communications based on a second NFC RF technology.

12. The computer program product of claim 11, further comprising:

transmitting a parameter selection response to the initiator NFC device.

13. The computer program product of claim 11, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

14. The computer program product of claim 11, wherein the first target sub-state and the second target sub-state are each a sub-state from among: a TARGET_A sub-state or a TARGET_F sub-state, wherein the TARGET_A sub-state is associated with peer communications based on a NFC-A RF technology, and wherein the TARGET_F sub-state is associated with peer communications based on a NFC-F RF technology.

15. The computer program product of claim 11, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

16. A computer program product, comprising:

a computer-readable medium comprising code for:

determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

17. The computer program product of claim 16, further comprising:

receiving a parameter selection response from the target NFC device indicating successful reception of the parameter selection request message.

18. The computer program product of claim 16, further comprising code for:

generating a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value; and

providing the first and second output parameters for use in a resolution process.

19. The computer program product of claim 16, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

20. The computer program product of claim 16, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

21. An apparatus for wireless communications, comprising:

means for receiving, by a target near field communication (NFC) device, a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

means for functioning in either a first target sub-state or a second target sub-state based on the first bit rate value, wherein the first target sub-state is associated with peer communications based on a first NFC radio frequency (RF) technology, and wherein the second target sub-state is associated with peer communications based on a second NFC RF technology.

22. The apparatus of claim 21, further comprising:

means for transmitting a parameter selection response to the initiator NFC device.

23. The apparatus of claim 21, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

24. The apparatus of claim 21, wherein the first target sub-state and the second target sub-state are each a sub-state from among: a TARGET_A sub-state or a TARGET_F sub-state, wherein the TARGET_A sub-state is associated with peer communications based on a NFC-A RF technology, and wherein the TARGET_F sub-state is associated with peer communications based on a NFC-F RF technology.

25. The apparatus of claim 21, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

26. An apparatus for wireless communications, comprising:

means for determining, by an initiator NFC device, a first bit rate value to be used for transmissions from the initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

means for transmitting the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

27. The apparatus of claim 26, further comprising:

means for receiving a parameter selection response from the target NFC device indicating successful reception of the parameter selection request message.

28. The apparatus of claim 26, further comprising:

means for generating a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate

value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value; and

means for providing the first and second output parameters for use in a resolution process.

29. The apparatus of claim 26, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

30. The apparatus of claim 26, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

31. An apparatus for NFC communications, comprising:

a memory;

a processor coupled to the memory;

a transceiver configured to receive a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

a NFC peer mode communications module coupled to at least one of the memory or the processor and configured to:

function in either a first target sub-state or a second target sub-state based on the first bit rate value, wherein the first target sub-state is associated with peer communications based on a first NFC radio frequency (RF) technology, and wherein the second target sub-state is associated with peer communications based on a second NFC RF technology.

32. The apparatus for NFC communications of claim 31, wherein the transceiver is further configured to:

transmit a parameter selection response to the initiator NFC device.

33. The apparatus for NFC communications of claim 31, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

34. The apparatus for NFC communications of claim 31, wherein the first target sub-state and the second target sub-state are each a sub-state from among: a TARGET_A sub-state or a TARGET_F sub-state, wherein the TARGET_A sub-state is associated with peer communications based on a NFC-A RF technology, and wherein the TARGET_F sub-state is associated with peer communications based on a NFC-F RF technology.

35. The apparatus for NFC communications of claim 31, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

36. An apparatus for NFC communications, comprising:

a transceiver;

a memory;

a processor coupled to the memory; and

a NFC peer mode communications module coupled to at least one of the memory or the processor and configured to:

determine a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device; and

wherein the transceiver is configured to transmit the first bit rate value and the second bit rate value to the target NFC device in a parameter selection request message.

37. The apparatus for NFC communications of claim 36, wherein the transceiver is configured to receive a parameter selection response from the target NFC device indicating successful reception of the parameter selection request message.

38. The apparatus for NFC communications of claim 36, wherein the NFC peer mode communications module is further configured to:

generate a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value; and

provide the first and second output parameters for use in a resolution process.

39. The apparatus for NFC communications of claim 36, wherein the first bit rate value and the second bit rate value each include a bit rate value from among: a value indicating maintenance of a currently set bit rate, a value indicating 106 kbps, a value indicating 212 kbps, or a value indicating 424 kbps.

40. The apparatus for NFC communications of claim 36, wherein the first bit rate value is a data rate send by the initiator (DSI) value, and wherein the second bit rate value is a data rate receive to initiator (DRI) value.

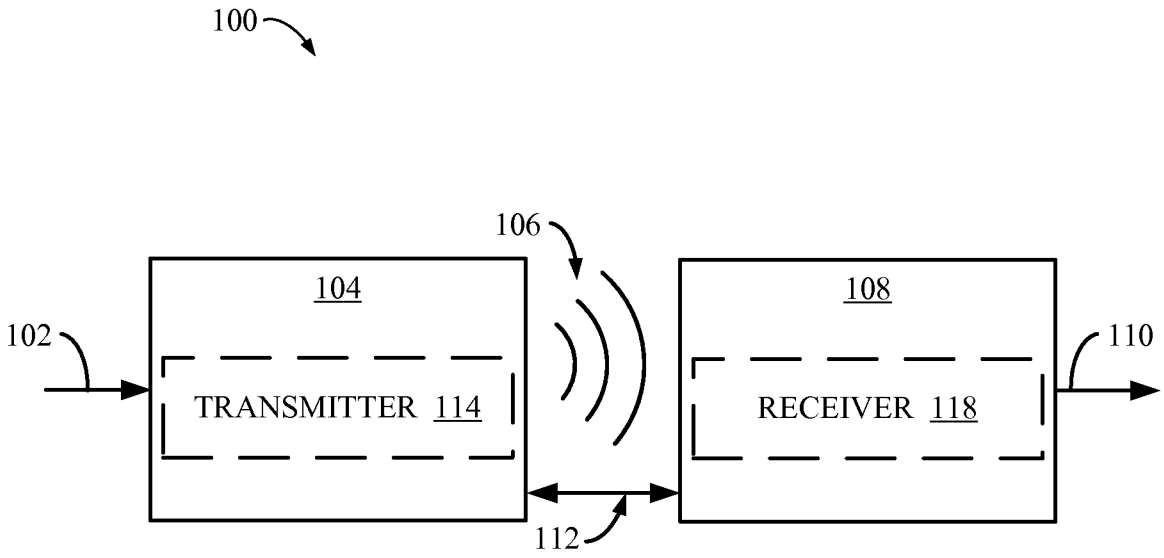

FIG. 1

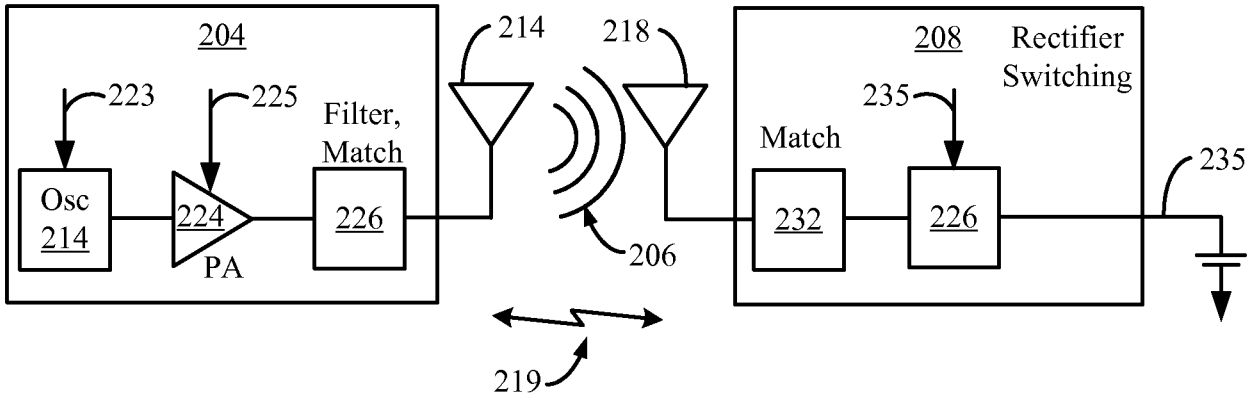
204
223
225
Filter,
Match
Osc
214
224
PA
226
214
218
206
219
208
Rectifier
Switching
235
Match
232
226
235

FIG. 2

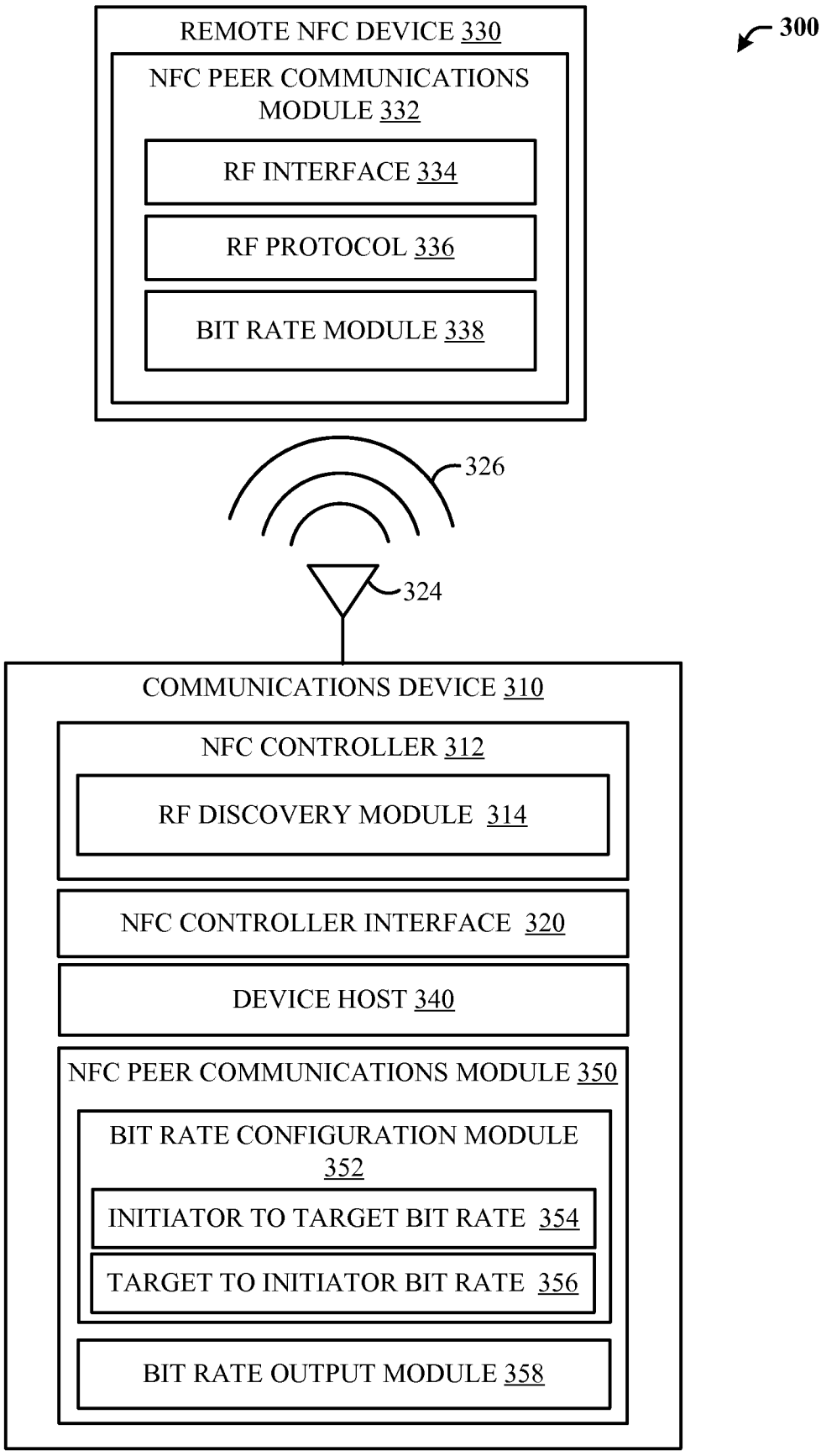
300
REMOTE NFC DEVICE 330
NFC PEER COMMUNICATIONS MODULE 332
RF INTERFACE 334
RF PROTOCOL 336
BIT RATE MODULE 338
326
324
COMMUNICATIONS DEVICE 310
NFC CONTROLLER 312
RF DISCOVERY MODULE 314
NFC CONTROLLER INTERFACE 320
DEVICE HOST 340
NFC PEER COMMUNICATIONS MODULE 350
BIT RATE CONFIGURATION MODULE 352
INITIATOR TO TARGET BIT RATE 354
TARGET TO INITIATOR BIT RATE 356
BIT RATE OUTPUT MODULE 358

FIG. 3

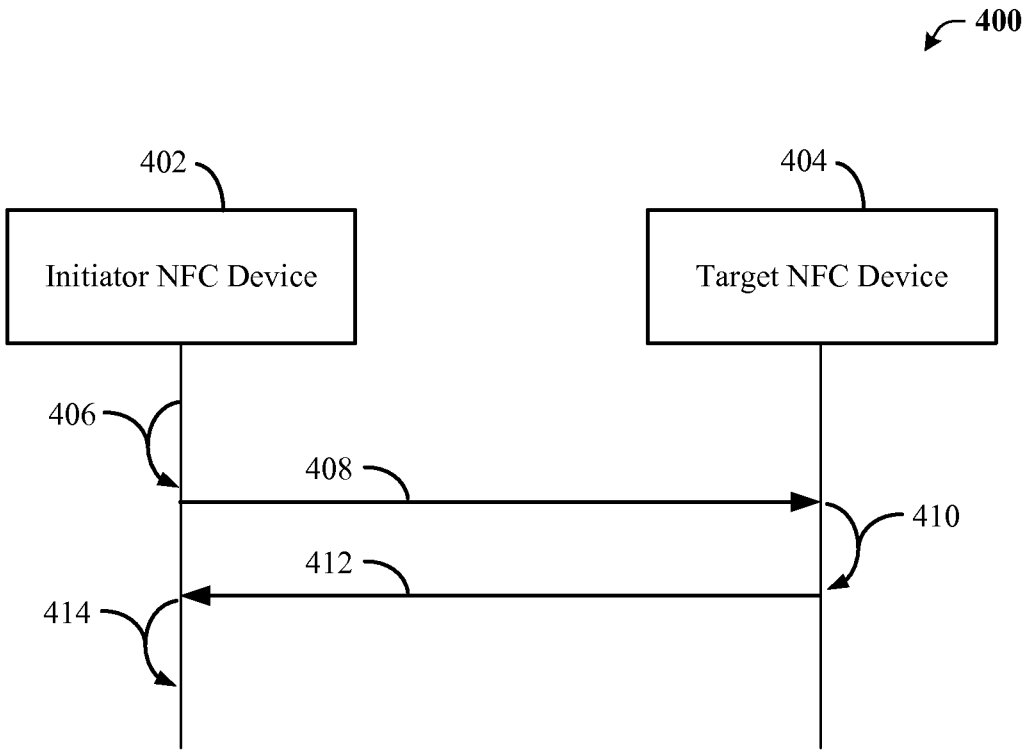
400
402
Initiator NFC Device
404
Target NFC Device
406
408
410
412
414

FIG. 4

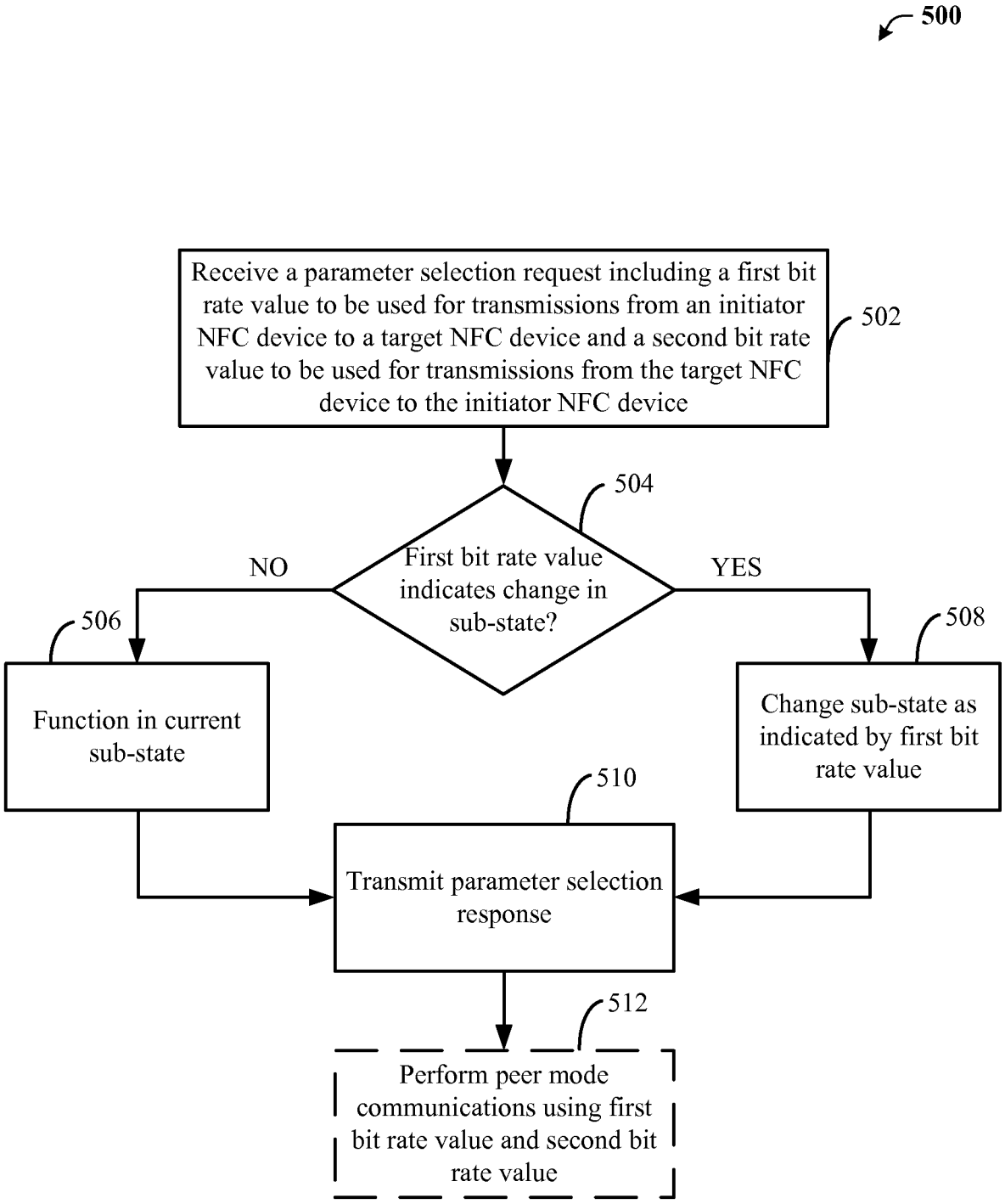
500
Receive a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device
502
504
First bit rate value indicates change in sub-state?
NO
YES
506
Function in current sub-state
508
Change sub-state as indicated by first bit rate value
510
Transmit parameter selection response
512
Perform peer mode communications using first bit rate value and second bit rate value

FIG. 5

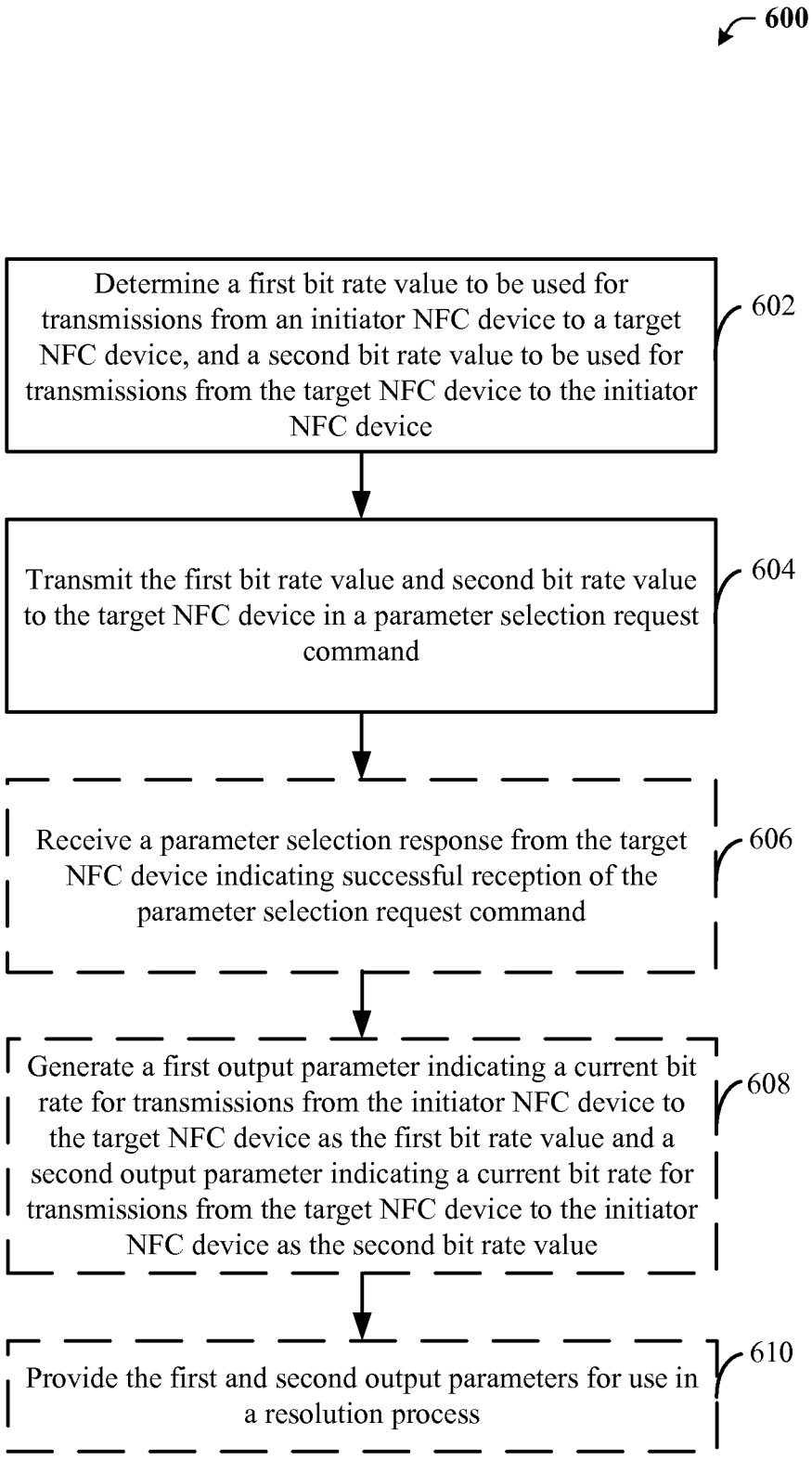
600
Determine a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device, and a second bit rate value to be used for transmissions from the target NFC device to the initiator NFC device
602
Transmit the first bit rate value and second bit rate value to the target NFC device in a parameter selection request command
604
Receive a parameter selection response from the target NFC device indicating successful reception of the parameter selection request command
606
Generate a first output parameter indicating a current bit rate for transmissions from the initiator NFC device to the target NFC device as the first bit rate value and a second output parameter indicating a current bit rate for transmissions from the target NFC device to the initiator NFC device as the second bit rate value
608
Provide the first and second output parameters for use in a resolution process
610

FIG. 6

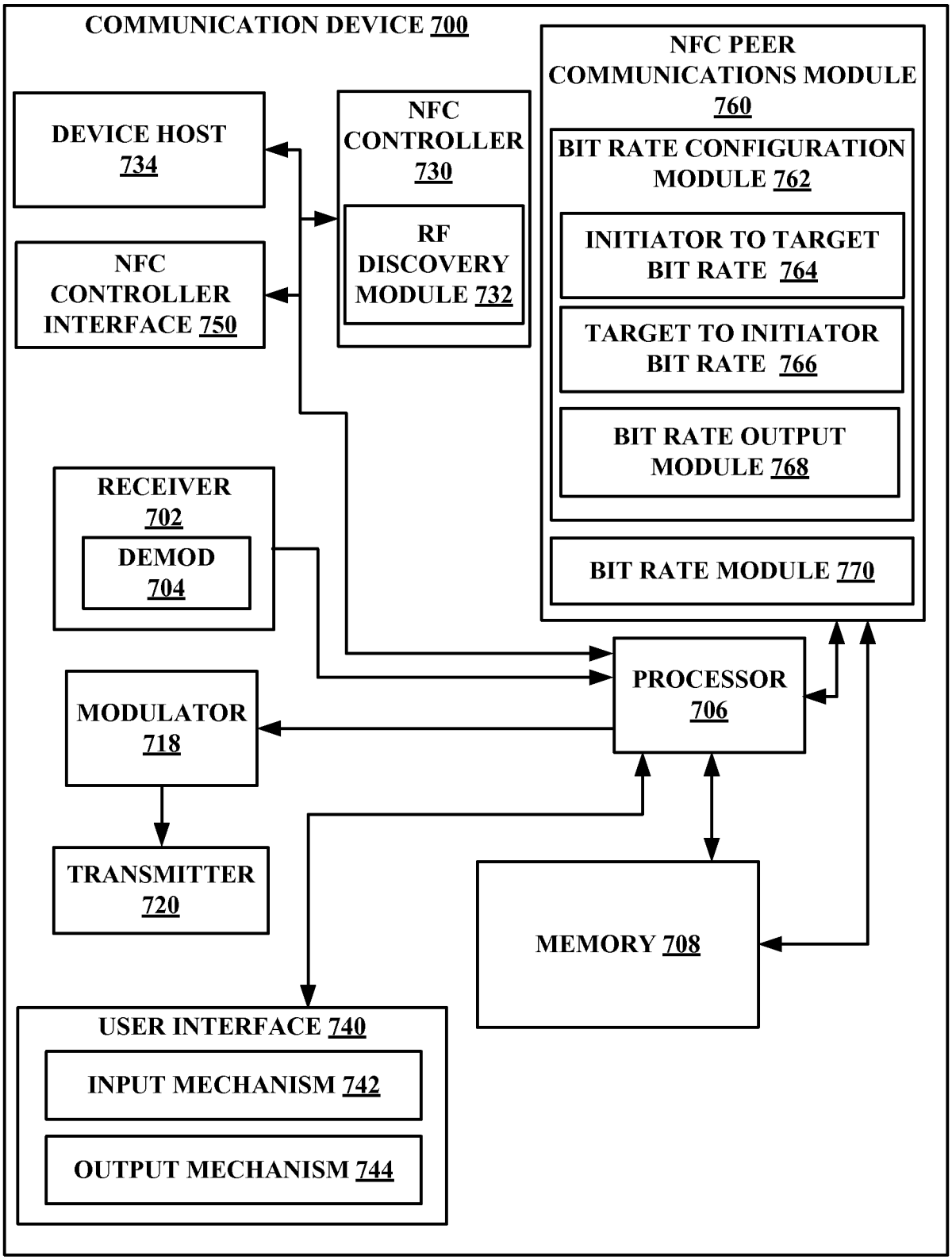
COMMUNICATION DEVICE 700
NFC PEER COMMUNICATIONS MODULE 760
DEVICE HOST 734
NFC CONTROLLER 730
BIT RATE CONFIGURATION MODULE 762
NFC CONTROLLER INTERFACE 750
RF DISCOVERY MODULE 732
INITIATOR TO TARGET BIT RATE 764
TARGET TO INITIATOR BIT RATE 766
BIT RATE OUTPUT MODULE 768
RECEIVER 702
DEMOD 704
BIT RATE MODULE 770
PROCESSOR 706
MODULATOR 718
TRANSMITTER 720
MEMORY 708
USER INTERFACE 740
INPUT MECHANISM 742
OUTPUT MECHANISM 744

FIG. 7

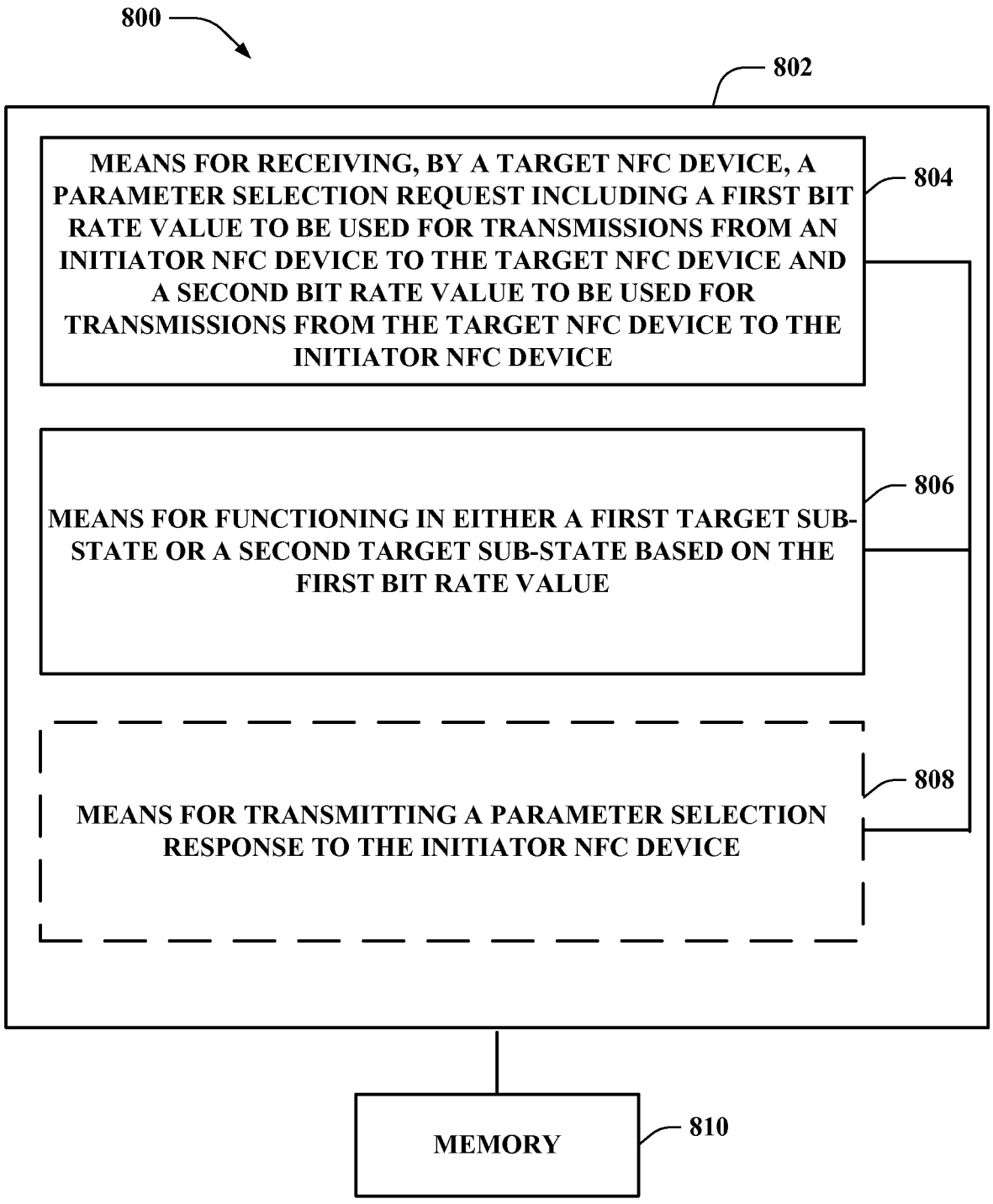
800
802
MEANS FOR RECEIVING, BY A TARGET NFC DEVICE, A PARAMETER SELECTION REQUEST INCLUDING A FIRST BIT RATE VALUE TO BE USED FOR TRANSMISSIONS FROM AN INITIATOR NFC DEVICE TO THE TARGET NFC DEVICE AND A SECOND BIT RATE VALUE TO BE USED FOR TRANSMISSIONS FROM THE TARGET NFC DEVICE TO THE INITIATOR NFC DEVICE
804
MEANS FOR FUNCTIONING IN EITHER A FIRST TARGET SUB-STATE OR A SECOND TARGET SUB-STATE BASED ON THE FIRST BIT RATE VALUE
806
MEANS FOR TRANSMITTING A PARAMETER SELECTION RESPONSE TO THE INITIATOR NFC DEVICE
808
MEMORY
810

FIG. 8

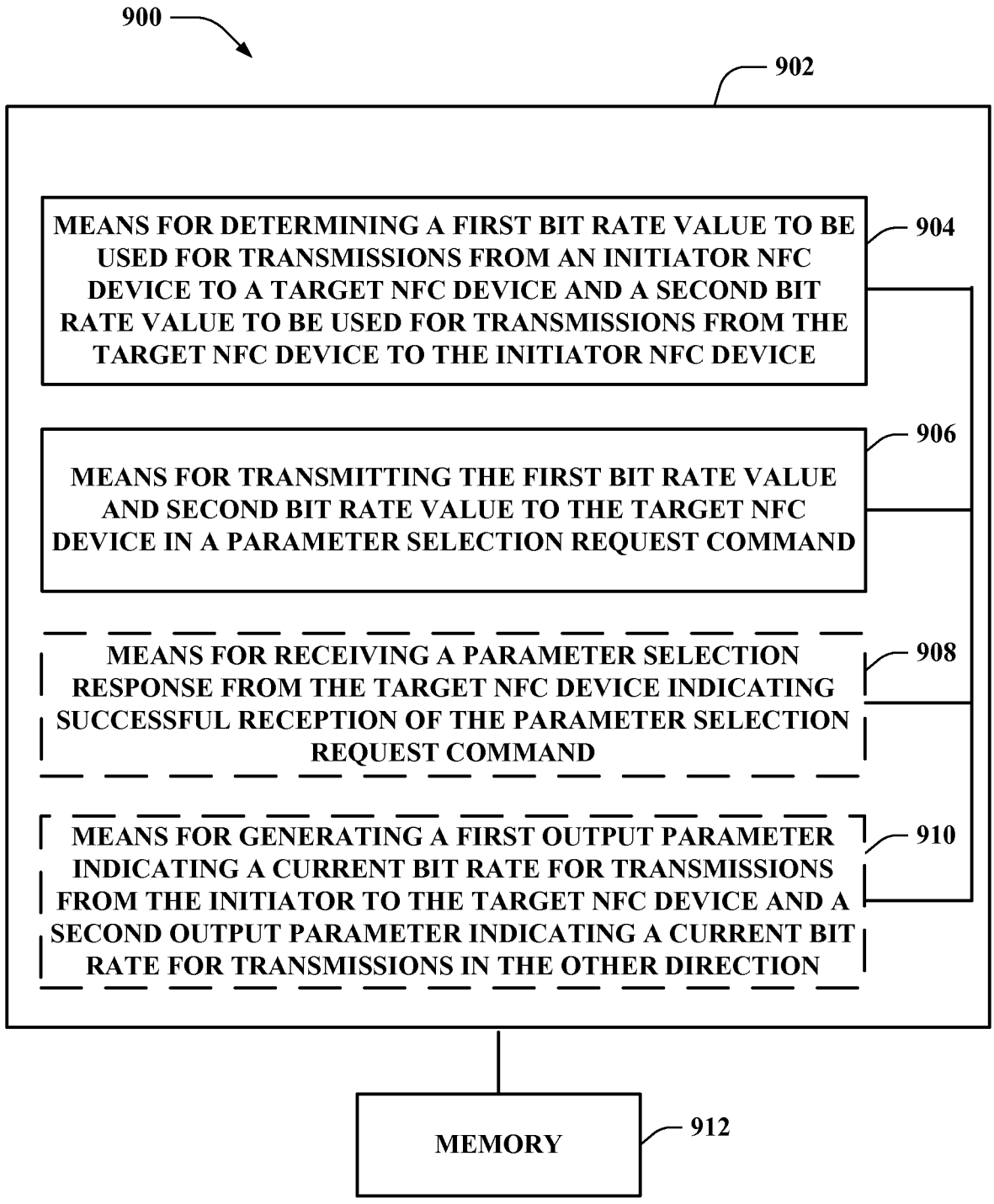
900
902
MEANS FOR DETERMINING A FIRST BIT RATE VALUE TO BE USED FOR TRANSMISSIONS FROM AN INITIATOR NFC DEVICE TO A TARGET NFC DEVICE AND A SECOND BIT RATE VALUE TO BE USED FOR TRANSMISSIONS FROM THE TARGET NFC DEVICE TO THE INITIATOR NFC DEVICE
904
MEANS FOR TRANSMITTING THE FIRST BIT RATE VALUE AND SECOND BIT RATE VALUE TO THE TARGET NFC DEVICE IN A PARAMETER SELECTION REQUEST COMMAND
906
MEANS FOR RECEIVING A PARAMETER SELECTION RESPONSE FROM THE TARGET NFC DEVICE INDICATING SUCCESSFUL RECEPTION OF THE PARAMETER SELECTION REQUEST COMMAND
908
MEANS FOR GENERATING A FIRST OUTPUT PARAMETER INDICATING A CURRENT BIT RATE FOR TRANSMISSIONS FROM THE INITIATOR TO THE TARGET NFC DEVICE AND A SECOND OUTPUT PARAMETER INDICATING A CURRENT BIT RATE FOR TRANSMISSIONS IN THE OTHER DIRECTION
910
MEMORY
912

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/035657

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W28/22
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)
H04W

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)
EPO-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	"Information technology Telecommunications and information exchange between systems Near Field Communication Interface and Protocol (NFCIP-1) = Technologies de l'information Telecommunications et echange d'information entre systemes Communication de champ proche Interface et protocole (NFCIP-1)", INTERNATIONAL STANDARD ISO/IEC, XX, XX, vol. 18092, no. 1st edition, 1 April 2004 (2004-04-01), page 66pp, XP007905654, figure 38 paragraphs [0007], [12.5.3.1], [12.5.3.2] ----- -/--	1-40

[X] Further documents are listed in the continuation of Box C.

[ ] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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	Date of mailing of the international search report
4 July 2013	16/07/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Chimet, Dan

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	"NFC Forum Device Requirements, High Level Conformance Requirements Revision V1.0", , 26 January 2010 (2010-01-26), XP055065535, Retrieved from the Internet: URL:http://certification.nfc-forum.org/docs/NFC_Forum_Device_Requirements.pdf [retrieved on 2013-06-06] paragraphs [02.2], [0003], [04.3], [0A.1] -----	1-40

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代理人 赵腾飞 王英
(51)Int.Cl.
H04W 28/22(2006.01)

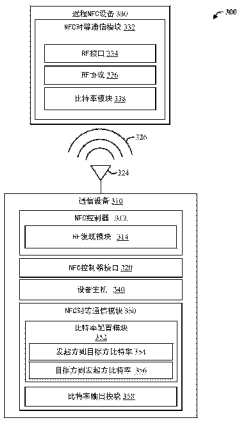
权利要求书4页 说明书19页 附图8页

(54)发明名称

用于改进使用活动通信模式的对等通信的方法和装置

(57)摘要

本文所公开的多个方面涉及实现针对NFC对等通信指定在每个方向上的不同比特率。在一个示例中，目标方NFC设备可以被配置为：接收参数选择请求，该参数选择请求包括：将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将在另一个方向上使用的第二比特率值；并且基于第一比特率值在第一或第二目标方子状态中运行。在另一个示例中，发起方NFC设备可以被配置为：确定将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将在另一个方向上使用的第二比特率值，并且在参数选择请求消息中发送第一和第二比特率值。



CN 104205928 A

1. 一种无线通信方法，包括：

由目标方近场通信 (NFC) 设备接收参数选择请求，所述参数选择请求包括：将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值；以及

基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行，其中，所述第一目标方子状态与基于第一 NFC 射频 (RF) 技术的对等通信相关联，并且其中所述第二目标方子状态与基于第二 NFC RF 技术的对等通信相关联。

2. 根据权利要求 1 所述的方法，还包括：向所述发起方 NFC 设备发送参数选择响应。

3. 根据权利要求 1 所述的方法，其中，所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

4. 根据权利要求 1 所述的方法，其中，所述第一目标方子状态和所述第二目标方子状态分别是来自下列各项之中的子状态：TARGET_A 子状态或 TARGET_F 子状态，其中，所述 TARGET_A 子状态与基于 NFC-A RF 技术的对等通信相关联，并且其中，所述 TARGET_F 子状态与基于 NFC-FRF 技术的对等通信相关联。

5. 根据权利要求 1 所述的方法，其中，所述第一比特率值是发起方发送数据速率 (DSI) 值，并且其中，所述第二比特率值是发起方接收数据速率 (DRI) 值。

6. 一种无线通信方法，包括：

由发起方 NFC 设备确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值；以及

在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值。

7. 根据权利要求 6 所述的方法，还包括：从所述目标方 NFC 设备接收指示对所述参数选择请求消息的成功接收的参数选择响应。

8. 根据权利要求 6 所述的方法，还包括：

生成指示用于从所述发起方 NFC 设备到所述目标方 NFC 设备的传输的当前比特率的第一输出参数作为所述第一比特率值，以及生成指示用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的当前比特率的第二输出参数作为所述第二比特率值；以及

提供所述第一输出参数以及所述第二输出参数来在解析过程中使用。

9. 根据权利要求 6 所述的方法，其中，所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

10. 根据权利要求 6 所述的方法，其中，所述第一比特率值是发起方发送数据速率 (DSI) 值，并且其中，所述第二比特率值是发起方接收数据速率 (DRI) 值。

11. 一种计算机程序产品，包括：

计算机可读介质，所述计算机可读介质包括用于执行如下操作的代码：

由目标方近场通信 (NFC) 设备接收参数选择请求，所述参数选择请求包括：将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方

NFC 设备到所述发起方 NFC 设备的传输的第二比特率值 ;以及

基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行,其中,所述第一目标方子状态与基于第一 NFC 射频 (RF) 技术的对等通信相关联,并且其中所述第二目标方子状态与基于第二 NFC RF 技术的对等通信相关联。

12. 根据权利要求 11 所述的计算机程序产品,还包括 :向所述发起方 NFC 设备发送参数选择响应。

13. 根据权利要求 11 所述的计算机程序产品,其中,所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值 :指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

14. 根据权利要求 11 所述的计算机程序产品,其中,所述第一目标方子状态和所述第二目标方子状态分别是来自下列各项之中的子状态 :TARGET_A 子状态或 TARGET_F 子状态,其中,所述 TARGET_A 子状态与基于 NFC-A RF 技术的对等通信相关联,并且其中,所述 TARGET_F 子状态与基于 NFC-F RF 技术的对等通信相关联。

15. 根据权利要求 11 所述的计算机程序产品,其中,所述第一比特率值是发起方发送数据速率 (DSI) 值,并且其中,所述第二比特率值是发起方接收数据速率 (DRI) 值。

16. 一种计算机程序产品,包括 :

计算机可读介质,所述计算机可读介质包括用于执行如下操作的代码 :

由发起方 NFC 设备确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值 ;以及

在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值。

17. 根据权利要求 16 所述的计算机程序产品,还包括 :

从所述目标方 NFC 设备接收指示对所述参数选择请求消息的成功接收的参数选择响应。

18. 根据权利要求 16 所述的计算机程序产品,还包括用于执行如下操作的代码 :

生成指示用于从所述发起方 NFC 设备到所述目标方 NFC 设备的传输的当前比特率的第一输出参数作为所述第一比特率值,以及生成指示用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的当前比特率的第二输出参数作为所述第二比特率值 ;以及

提供所述第一输出参数以及所述第二输出参数来在解析过程中使用。

19. 根据权利要求 16 所述的计算机程序产品,其中,所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值 :指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

20. 根据权利要求 16 所述的计算机程序产品,其中,所述第一比特率值是发起方发送数据速率 (DSI) 值,并且其中,所述第二比特率值是发起方接收数据速率 (DRI) 值。

21. 一种用于无线通信的装置,包括 :

用于由目标方近场通信 (NFC) 设备接收参数选择请求的模块,所述参数选择请求包括 :将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值 ;以及

用于基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行的模块，其中，所述第一目标方子状态与基于第一 NFC 射频 (RF) 技术的对等通信相关联，并且其中所述第二目标方子状态与基于第二 NFC RF 技术的对等通信相关联。

22. 根据权利要求 21 所述的装置，还包括：用于向所述发起方 NFC 设备发送参数选择响应的模块。

23. 根据权利要求 21 所述的装置，其中，所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

24. 根据权利要求 21 所述的装置，其中，所述第一目标方子状态和所述第二目标方子状态分别是来自下列各项之中的子状态：TARGET_A 子状态或 TARGET_F 子状态，其中，所述 TARGET_A 子状态与基于 NFC-A RF 技术的对等通信相关联，并且其中，所述 TARGET_F 子状态与基于 NFC-F RF 技术的对等通信相关联。

25. 根据权利要求 21 所述的装置，其中，所述第一比特率值是发起方发送数据速率 (DSI) 值，并且其中，所述第二比特率值是发起方接收数据速率 (DRI) 值。

26. 一种用于无线通信的装置，包括：

用于由发起方 NFC 设备确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值的模块；以及

用于在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值的模块。

27. 根据权利要求 26 所述的装置，还包括：

用于从所述目标方 NFC 设备接收指示对所述参数选择请求消息的成功接收的参数选择响应的模块。

28. 根据权利要求 26 所述的装置，还包括：

用于生成指示用于从所述发起方 NFC 设备到所述目标方 NFC 设备的传输的当前比特率的第一输出参数作为所述第一比特率值，以及生成指示用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的当前比特率的第二输出参数作为所述第二比特率值的模块；以及

用于提供所述第一输出参数以及所述第二输出参数来在解析过程中使用的模块。

29. 根据权利要求 26 所述的装置，其中，所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

30. 根据权利要求 26 所述的装置，其中，所述第一比特率值是发起方发送数据速率 (DSI) 值，并且其中，所述第二比特率值是发起方接收数据速率 (DRI) 值。

31. 一种用于 NFC 通信的装置，包括：

存储器；

耦合到所述存储器的处理器；

收发机，其被配置为：接收参数选择请求，所述参数选择请求包括将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值；以及

NFC 对等模式通信模块，其被耦合到所述存储器或所述处理器中的至少一个，并且被配置为：

基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行，其中，所述第一目标方子状态与基于第一 NFC 射频 (RF) 技术的对等通信相关联，并且其中所述第二目标方子状态与基于第二 NFC RF 技术的对等通信相关联。

32. 根据权利要求 31 所述的用于 NFC 通信的装置，其中，所述收发机还被配置为：向所述发起方 NFC 设备发送参数选择响应。

33. 根据权利要求 31 所述的用于 NFC 通信的装置，其中，所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

34. 根据权利要求 31 所述的用于 NFC 通信的装置，其中，所述第一目标方子状态和所述第二目标方子状态分别是来自下列各项之中的子状态：TARGET_A 子状态或 TARGET_F 子状态，其中，所述 TARGET_A 子状态与基于 NFC-A RF 技术的对等通信相关联，并且其中，所述 TARGET_F 子状态与基于 NFC-F RF 技术的对等通信相关联。

35. 根据权利要求 31 所述的用于 NFC 通信的装置，其中，所述第一比特率值是发起方发送数据速率 (DSI) 值，并且其中，所述第二比特率值是发起方接收数据速率 (DRI) 值。

36. 一种用于 NFC 通信的装置，包括：

收发机；

存储器；

处理器，其被耦合到所述存储器；以及

NFC 对等模式通信模块，其被耦合到所述存储器或所述处理器中的至少一个，并且被配置为：

确定将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值；以及

其中，所述收发机被配置为：在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值。

37. 根据权利要求 36 所述的用于 NFC 通信的装置，其中，所述收发机被配置为：从所述目标方 NFC 设备接收指示对所述参数选择请求消息的成功接收的参数选择响应。

38. 根据权利要求 36 所述的用于 NFC 通信的装置，其中，所述 NFC 对等模式通信模块还被配置为：

生成指示用于从所述发起方 NFC 设备到所述目标方 NFC 设备的传输的当前比特率的第一输出参数作为所述第一比特率值，以及生成指示用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的当前比特率的第二输出参数作为所述第二比特率值；以及

提供所述第一输出参数以及所述第二输出参数来在解析过程中使用。

39. 根据权利要求 36 所述的用于 NFC 通信的装置，其中，所述第一比特率值和所述第二比特率值分别包括来自下列各项之中的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、或指示 424kbps 的值。

40. 根据权利要求 36 所述的用于 NFC 通信的装置，其中，所述第一比特率值是发起方发送数据速率 (DSI) 值，并且其中，所述第二比特率值是发起方接收数据速率 (DRI) 值。

用于改进使用活动通信模式的对等通信的方法和装置

[0001] 基于 35U.S.C. §119 要求优先权

[0002] 本专利申请要求于 2012 年 4 月 10 日提交的、名称为“METHODS AND APPARATUS FOR IMPROVING PEER COMMUNICATIONS USING AN ACTIVE COMMUNICATION MODE”的临时申请 No.61/622,292 的优先权，该临时申请已经转让给本申请的受让人，故以引用方式将其明确地并入本文。

背景技术

[0003] 概括地说，所公开的多个方面涉及设备之间和 / 或设备之内的通信，具体地说，所公开的多个方面涉及用于通过允许使用来自目标方近场通信 (NFC) 设备和发起方 NFC 设备，以及从发起方 NFC 设备到目标方 NFC 设备的不同的比特率来改进对等通信的方法和系统。

[0004] 技术的进步导致了更小并且更强大的个人计算设备。例如，目前存在多种便携式个人计算设备，其包括诸如便携式无线电话、个人数字助理 (PDA) 和寻呼设备的无线计算设备，它们每个都体积小、重量轻、并且能够被用户容易地携带。更具体地说，例如，便携式无线电话还包括在无线网络上传送语音和数据分组的蜂窝电话。许多这样的蜂窝电话具有不断增加的计算能力，因此，正在变的与小型个人计算机和手持 PDA 无异。此外，这样的设备正在实现使用各种频率和适当的覆盖区域的通信，例如蜂窝通信、无线局域网 (WLAN) 通信、NFC 等

[0005] 具有 NFC 能力的设备可以操作在轮询模式和 / 或监听模式。作为与对等模式通信相关联的设备激活活动过程的一部分，发起方 NFC 设备可以指定比特率。NFC 论坛活动规范 (NFC Forum Activity specification) 的 1.0 版本仅包括用于配置要在对等模式中使用的比特率的单个参数。因此，目前还没有办法来配置设备以针对每个方向使用不同的比特率。

[0006] 因此，可能期望改进的装置和方法，所述改进的装置和方法用于提供机制来实现针对对等通信指定在每个方向上的不同比特率。

发明内容

[0007] 下面给出一个或多个方面的摘要来提供对这些方面的基本理解。本摘要不是所有所设想的方面的详尽概述，并且不旨在标识所有方面的关键或重要元素，也不旨在描述任何或所有方面的范围。其目的是为了呈现一个或多个方面的一些概念，作为随后呈现的更详细的描述的序言。

[0008] 结合实现针对对等通信指定在每个方向上的不同比特率描述了多个方面。在一个示例中，目标方 NFC 设备可以被配置为接收参数选择请求，所述参数选择请求包括 :将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及将在另一个方向中使用的第二比特率值。所述目标方 NFC 设备还可以被配置为 :基于所述第一比特率值在第一或第二目标方子状态中运行。在另一个示例中，发起方 NFC 设备可以被配置为 :确定将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将在另一个方向上使用的

第二比特率值。所述发起方 NFC 设备还可以被配置为 :在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值。

[0009] 根据多个相关方面,描述了用于实现针对对等通信指定在每个方向上的不同比特率的方法。所述方法可以包括 :由目标方 NFC 设备接收参数选择请求,所述参数选择请求包括 :将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述方法可以还包括 :基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行。

[0010] 另一个方面涉及一种通信装置。所述通信装置可以包括 :用于由目标方 NFC 设备接收参数选择请求的模块,所述参数选择请求包括 :将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述通信装置可以还包括 :用于基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行的模块。

[0011] 另一个方面涉及一种通信装置。所述通信装置可以包括 NFC 对等模式通信模块,所述 NFC 对等模式通信模块被配置为接收参数选择请求,所述参数选择请求包括 :将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述 NFC 对等模式通信模块还可以被配置为 :基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行。

[0012] 另一个方面涉及一种计算机程序产品,该计算机程序产品可以具有计算机可读介质,所述计算机可读介质包括用于由目标方 NFC 设备接收参数选择请求的代码,所述参数选择请求包括 :将用于从发起方 NFC 设备到所述目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述计算机可读介质可以还包括 :用于基于所述第一比特率值在第一目标方子状态或第二目标方子状态中运行的代码。

[0013] 根据多个有关方面,描述了用于实现针对对等通信指定在每个方向上的不同比特率的另一种方法。所述方法可以包括 :由发起方 NFC 设备确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述方法可以还包括 :在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值。

[0014] 另一个方面涉及一种通信装置。所述通信装置可以包括 :用于由发起方 NFC 设备确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值的模块。所述通信装置可以还包括 :用于在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值的模块。

[0015] 另一个方面涉及一种通信装置。所述装置可以包括 NFC 对等模式通信模块,所述 NFC 对等模式通信模块被配置为 :确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述 NFC 对等模式通信模块还可以被配置为 :在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值。

[0016] 另一个方面涉及一种计算机程序产品,该计算机程序产品可以具有计算机可读介

质，所述计算机可读介质包括用于执行如下操作的代码：由发起方 NFC 设备确定将用于从所述发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从所述目标方 NFC 设备到所述发起方 NFC 设备的传输的第二比特率值。所述计算机可读介质可以还包括：用于在参数选择请求消息中向所述目标方 NFC 设备发送所述第一比特率值和所述第二比特率值的代码。

[0017] 针对前述和相关目的的实现，一个或多个方面包括在下文中全面描述并且在权利要求中具体指出的特征。下面的描述和附图详细阐述了一个或多个方面的某些说明性的特征。然而，这些特征指示各种方式中的一些方式，各种方面的原理可以在所述各种方式中使用，并且该描述旨在包括所有这些方面以及它们的等价物。

附图说明

[0018] 将在下文中结合附图对所公开的多个方面进行描述，提供附图来说明而不是限制所公开的方面，其中，相似的符号表示相似的元件，并且其中：

[0019] 图 1 是根据一个方面的无线通信系统的框图。

[0020] 图 2 是根据一个方面的无线通信系统的示意图。

[0021] 图 3 是根据一个方面的 NFC 环境的框图；

[0022] 图 4 是根据一个方面的、描述针对 NFC 对等模式通信在每个方向上使用不同的比特率的示例的呼叫流程图；

[0023] 图 5 是根据一个方面的、描述针对 NFC 对等模式通信在每个方向上使用不同的比特率的示例的流程图；

[0024] 图 6 是根据一个方面的、描述针对 NFC 对等模式通信在每个方向上使用不同的比特率的另一示例的流程图；

[0025] 图 7 是根据一个方面的通信设备的示例架构的功能框图；

[0026] 图 8 是根据一个方面的、用于针对 NFC 对等模式通信在每个方向上使用不同的比特率的示例通信系统的框图；以及

[0027] 图 9 是根据一个方面的、用于针对 NFC 对等模式通信在每个方向上使用不同的比特率的示例通信系统的框图。

具体实施方式

[0028] 现在参照附图描述各种方面。在下面的描述中，为了解释的目的，阐述了大量具体细节，以便提供对一个或多个方面的透彻理解。然而，应当理解，也可以不用这些具体细节来实施这些方面。

[0029] 一般来说，当一个设备在 NFC 设备和 / 或标签的覆盖区域的范围内时，它可以识别该 NFC 目标方设备和 / 或标签。此后，该设备可以获得足够的信息以允许建立通信。可以建立的一种形式的通信是对等通信链路。如本文所述，发起方 NFC 设备可以被配置为向目标方 NFC 设备指示：针对 NFC 对等模式通信在每个方向使用不同的比特率。

[0030] 图 1 根据本发明的各种示例性实施例示出了无线通信系统 100。将输入功率 102 提供给发射机 104 用于产生辐射场 106 来提供能量转移。接收机 108 耦合到辐射场 106 并且产生输出功率 110，耦合到输出功率 110 的设备（未示出）存储或消耗该输出功率 110。

发射机 104 和接收机 108 被距离 112 分开。在示例性的实施例中，根据相互的谐振关系来配置发射机 104 和接收机 108，并且当接收机 108 的谐振频率与发射机 104 的谐振频率非常接近时，在接收机 108 位于辐射场 106 的“近场”中时，发射机 104 和接收机 108 之间的传输损耗是最小的。

[0031] 发射机 104 还包括用来提供用于能量传输的模块的发射天线 114。接收机 108 包括接收天线 118 作为用于能量接收的模块。根据与发射天线和接收天线相关的应用和设备来确定发射天线和接收天线的尺寸。如上所述，通过将发射天线的近场中的很大一部分的能量耦合到接收天线，而不是用电磁波将大部分能量传播到远场，来发生有效的能量转移。当在该近场中时，可以在发射天线 114 和接收天线 118 之间产生耦合模式。在天线 114 和天线 118 周围的可能发生该近场耦合的区域在本文中被称为耦合模式区域。

[0032] 图 2 是示例近场无线通信系统的示意图。发射机 204 包括振荡器 222、功率放大器 224、滤波器和匹配电路 226。该振荡器被配置为在所希望的频率处产生信号，可以响应于调整信号 223 来对该信号进行调整。功率放大器 224 可以对振荡器信号进行放大，放大量响应于控制信号 225。可以包括滤波器和匹配电路 226 来滤除谐波或其它不需要的频率，并且将发射机 204 的阻抗与发射天线 214 进行匹配。

[0033] 如图 2 中所示，接收机 208 可以包括匹配电路 232 以及整流器和开关电路 234 来生成 DC 功率输出为电池 236 充电，或者为耦合到该接收机的设备（未示出）供电。可以包括匹配电路 232 来将接收机 208 的阻抗与接收天线 218 进行匹配。接收机 208 和发射机 204 可以在分隔的通信信道 219（例如，蓝牙、zigbee、蜂窝等）上进行通信。

[0034] 如图 2 中所示，接收机 208 可以包括匹配电路 232 以及整流器和开关电路 234 来生成 DC 功率输出为电池 236 充电，或者为耦合到该接收机的设备（未示出）供电。可以包括匹配电路 232 来将接收机 208 的阻抗与接收天线 218 进行匹配。接收机 208 和发射机 204 可以在分隔的通信信道 119（例如，蓝牙、zigbee、蜂窝等）上进行通信。

[0035] 参考图 3，示出了根据一个方面的通信网络 300 的框图。通信网络 300 可以包括通信设备 310，该通信设备 310 可以使用一种或多种 NFC 技术 326（例如，NFC-A、NFC-B、NFC-F 等）通过天线 324 与远程 NFC 设备 330 通信。在一个方面中，远程 NFC 设备 330 和 / 或通信设备 310 可操作以使用一个或多个 RF 协议 336，通过 NFC 对等模式通信模块 332 通过一个或多个 RF 接口 334 进行通信。另外，NFC 对等模式通信模块 332 可以包括比特率模块 338，该比特率模块 338 可操作以确定用于来自通信设备 310 的通信以及用于到通信设备 310 的通信的比特率。在一个方面中，可以为比特率模块 338 提供针对 NFC 对等模式通信在每个方向上使用的不同比特率值。在另一个方面中，通信设备 310 可操作以被连接到接入网络和 / 或核心网络（例如，CDMA 网络、GPRS 网络、UMTS 网络以及其它类型的有线和无线通信网络）。在一个方面中，远程 NFC 设备 330 可以包括但不限于远程 NFC 标签、读取器 / 写入器设备、对等发起方设备、远程对等目标方设备等。

[0036] 通信设备 310 可以包括 NCI 320。在一个方面中，NCI 320 可操作以实现在具有 NFC 能力的天线和 NFC 控制器 312 之间的通信。NCI 320 可操作以运行在监听模式和 / 或轮询模式中。在被动通信模式通信期间，无论通信设备 310 以哪种模式开始对等通信，都会在该对等通信期间保持该模式。在主动通信模式通信期间，通信设备 310 可以在对等通信链路期间切换监听模式和轮询模式责任。

[0037] 通信设备 310 可以包括 NFC 控制器 (NFCC)312。在一个方面中，NFCC312 可以包括 RF 发现模块 314。RF 发现模块 314 可操作以使用 RF 发现循环作为发现过程的一部分来执行 RF 发现，以实现对等模式通信。DH 340 可操作以生成命令以促使 NFCC 312 来执行与 RF 发现相关联的各种功能。

[0038] 通信设备 310 可以包括 NFC 对等通信模块 350。NFC 对等通信模块 350 可操作以实现用于对等通信的各种模式和 / 或配置。在一个方面中，NFC 对等通信模块 350 可以包括比特率配置模块 352，该比特率配置模块 352 可操作以配置对等模式通信，在该对等模式通信中在每个方向上可以使用不同的比特率。在一个方面中，比特率配置模块 352 可以配置发起方到目标方比特率 354 和目标方到发起方比特率 356。在一个方面中，发起方到目标方比特率 354 与目标方到发起方比特率 356 可以是相同的。在另一个方面中，比特率配置模块 352 可以用能够促使通信设备 (例如，310、330) 维持当前值 (例如，默认的比特率) 的值，来配置目标方比特率 354 和目标方到发起方比特率 356。例如，在通信设备处于支持基于 NFC-F RF 技术的通信的就绪状态的情况下，可以使用 424 千比特每秒 (kbps) 的默认值。在另一个方面中，比特率配置模块 352 可以用能够促使通信设备 (例如，310、330) 使用一个或多个比特率选项的值，来配置目标方比特率 354 以及目标方到发起方比特率 356。例如，不同的比特率选项可包括但不限于 :106kbps、212kbps、424kbps 等。表 1 提供了在设备激活期间所使用的示例配置参数。

[0039]

名称	格式	大小	描述
CON_ATR	十六进制	3 字节	ATR_REQ 命令参数 • 针对字节 1 的编码参照 [DIGITAL] (ATR_REQ 的字节 13) 。 • 针对字节 2 的编码参照 [DIGITAL] (ATR_REQ 的字节 14) 。 • 针对字节 3 的编码参照 [DIGITAL] (ATR_REQ 的字节 15) 。 • 针对字节 4 的编码参照 [DIGITAL] (ATR_REQ 的字节 16)。
CON_GB	十六进制	n 字节	ATR_REQ 或者 ATTRIB 的更高层 INF 的通用字节 参照 ATR_REQ 的[DIGITAL]字节 17+n 以及 ATTRIB 的[DIGITAL]字节 10+n。 对于 ATR_REQ 而言，这些字节包含通用字节（G_T0.....G_Tn）作为针对 LLCP 的信息。 对于 ATTRIB 而言，这些字节包含高层 INF。
CON_RATS	十六进制	1 字节	RATS 命令参数 针对字节 1 的编码参照 [DIGITAL] (RATS 命令的字节 2) 。
CON_ATTRIB	十六进制	3 字节	ATTRIB 命令参数 • 针对字节 1 的编码参照 [DIGITAL] (ATTRIB 命令的字节 6) 。 • 针对字节 2 的编码参照 [DIGITAL] (ATTRIB 命令的字节 7) 。 • 针对字节 3 的编码参照 [DIGITAL] (ATTRIB 命

[0040]

名称	格式	大小	描述
			令的字节 8) 。 • 针对字节 4 的编码参照 [DIGITAL] (ATTRIB 命令的字节 9) 。
CON_BITR_NFC_DEP_I2T	整数	1 字节	在从发起方到目标方的方向上针对 NFC-DEP 的期望比特率 • 0：保持比特率 • 1：106 kbps • 2：212 kbps • 3：424 kbps
CON_BITR_NFC_DEP_T2I	整数	1 字节	在从目标方到发起方的方向上针对 NFC-DEP 的期望比特率 • 0：保持比特率 • 1：106 kbps • 2：212 kbps • 3：424 kbps

[0041] 表 1 :设备激活动作 - 配置参数

[0042] 在表 1 中可以看出,可以针对通信的每个方向配置不同的比特率。可以使用 CON_BITR_NFC_DEP_I2T 参数来指示发起方到目标方比特率 354,并且可以使用 CON_BITR_NFC_DEP_T2I 参数来指示目标方到发起方比特率 346。

[0043] NFC 对等通信模块 350 可使用发起方到目标方比特率 354 和目标方到发起方比特率 356 的值作为在参数选择请求消息中的参数。例如,在参数选择请求 (例如,PSL_REQ) 消息中,可以将发起方到目标方比特率 354 用作发起方发送数据速率 (DSI, data rate send by initiator) 值,并且可以将目标方到发起方比特率 356 用作发起方接收数据速率 (DRI, data rate received by initiator) 值。

[0044] 在通信设备 (例如,310,330) 先前可操作以使用 NFC-A RF 技术的方面中,可以从发起方到目标方比特率 354 以及目标方到发起方比特率 356 参数来计算 DSI 和 DRI,如下所述的。当发起方到目标方比特率 354(例如, CON_BITR_NFC_DEP_I2T) 等于 0 或 1 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于 000b。此外,当发起方到目标方比特率 354(例如,CON_BITR_NFC_DEP_I2T) 等于 2 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于 001b。此外,当发起方到目标方比特率 354(例如,CON_BITR_NFC_DEP_I2T) 等于或大于 3 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于 010b。类似地,当目标方到发起方比特率 356(例如,CON_BITR_NFC_DEP_T2I) 等于 0 或 1 时,那么 NFC 对等通信模块 350 将 DRI 设置为等于 000b。当目标方到发起方比特率 356(例如,CON_BITR_NFC_DEP_T2I) 等于 2 时,那么 NFC 对

等通信模块 350 将 DRI 设置为等于 001b。当目标方到发起方比特率 356(例如,CON_BITR_NFC_DEP_T2I) 等于或大于 3 时,那么 NFC 对等通信模块 350 将 DRI 设置等于为 010b。

[0045] 在通信设备 (例如,310,330) 先前可操作以使用 NFC-F RF 技术的方面中,可以从发起方到目标方比特率 354 以及目标方到发起方比特率 356 参数来计算 DSI 和 DRI,如下所述的。当发起方到目标方比特率 354(例如,CON_BITR_NFC_DEP_I2T) 等于 0 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于当前比特率。当发起方到目标方比特率 354(例如,CON_BITR_NFC_DEP_I2T) 等于 1 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于 000b。当发起方到目标方比特率 354(例如, CON_BITR_NFC_DEP_I2T) 等于 2 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于 001b。当发起方到目标方比特率 354(例如,CON_BITR_NFC_DEP_I2T) 等于或大于 3 时,那么 NFC 对等通信模块 350 将 DSI 设置为等于 010b。当目标方到发起方比特率 356(例如, CON_BITR_NFC_DEP_T2I) 等于 0 时,那么 NFC 对等通信模块 350 将 DRI 设置为等于当前比特率。当目标方到发起方比特率 356(例如,CON_BITR_NFC_DEP_T2I) 等于 1 时,那么 NFC 对等通信模块 350 将 DRI 设置为等于 000b。当目标方到发起方比特率 356(例如,CON_BITR_NFC_DEP_T2I) 等于 2 时,那么 NFC 对等通信模块 350 将 DRI 设置为等于 001b。当目标方到发起方比特率 356(例如, CON_BITR_NFC_DEP_T2I) 等于或大于 3 时,那么 NFC 对等通信模块 350 将 DRI 设置等于为 010b。

[0046] 在一个方面中,比特率配置模块 352 还可以被配置为针对与和 NFC 相关的动作相关联的各个方面来使用各种配置文件 (profile) 配置。例如,表 2 描述了可以被用于对等 (P2P) 轮询的配置参数。在这个方面中,技术检测过程可以针对两个方向上的 NFC-F 使用 424kbit/s 的速度。在配置文件配置参数的另一个示例中,表 3 提供了可以在 NFC 数据交换格式 (NDEF) 轮询期间使用的配置参数。在配置文件配置参数的另一个示例中,表 4 提供了可以在 P2PNDEF 轮询期间使用的配置参数。

[0047]

参数	P2P
CON_POLL_A	0b
CON_POLL_B	0b
CON_POLL_F	1b
CON_POLL_P	0b
CON_BAIL_OUT_A	0b
CON_BAIL_OUT_B	0b
CON_DEVICES_LIMIT	01h
CON_ADV_FEAT	0b
CON_ATR	如在 [DIGITAL]中所定义的
CON_GB	LLCP 参数
CON_RATS	NA
CON_ATTRIB	NA
CON_BITR_NFC_DEP_I2T	3
CON_BITR_NFC_DEP_T2I	3

[0048] 表 2 :P2P 轮询配置文件配置参数

[0049]

参数	NDEF
CON_POLL_A	1b
CON_POLL_B	1b
CON_POLL_F	1b
CON_POLL_P	0b
CON_BAIL_OUT_A	0b
CON_BAIL_OUT_B	0b
CON_DEVICES_LIMIT	04h
CON_ADV_FEAT	0b
CON_ATR	NA
CON_GB	无
CON_RATS	如在[DIGITAL]中所定义的
CON_ATTRIB	如在[DIGITAL]中所定义的
CON_BITR_NFC_DEP_I2T	0
CON_BITR_NFC_DEP_T2I	0

[0050] 表 3 :NDEF 轮询配置文件配置参数

[0051]

参数	NDEF
CON_POLL_A	1b
CON_POLL_B	1b
CON_POLL_F	1b
CON_POLL_P	0b
CON_BAIL_OUT_A	0b
CON_BAIL_OUT_B	0b
CON_DEVICES_LIMIT	04h
CON_ADV_FEAT	0b
CON_ATR	如在 [DIGITAL] 中所定义的

CON_GB	LLCP 参数
CON_RATS	如在 [DIGITAL] 中所定义的
CON_ATTRIB	如在 [DIGITAL] 中所定义的
CON_BITR_NFC_DEP_I2T	3
CON_BITR_NFC_DEP_T2I	3

[0052] 表 4 :P2PNDEF 轮询配置文件配置参数

[0053] 在另一个方面中，NFC 对等通信模块 350 可以还包括比特率输出模块 358，该比特率输出模块 358 可操作以提供目标方比特率 354 以及目标方到发起方比特率 356 的值，用于一个或多个其它通信建立过程（例如，解析 (resolution) 过程）。表 5 提供了在设备激活期间所生成的示例输出参数值。

[0054]

名称	格式	大小	说明
INT_INDEX	整数	1 字节	激活的设备的标识符索引
INT_DX_BIT_RATE_I2T	整数	1 字节	在从发起方到目标方的方向上在 NFC_DEP 激活的情况下的当前比特率： • 0：保持比特率 • 1：106 kbps • 2：212 kbps • 3：424 kbps
INT_DX_BIT_RATE_T2I	整数	1 字节	在从目标方到发起方的方向上在 NFC_DEP 激活的情况下的当前比特率: • 0：保持比特率 • 1：106 kbps • 2：212 kbps • 3：424 kbps

[0055] 表 5 :设备激活动作 - 输出参数

[0056] 在表 5 中可以看出，可以使用 INT_DX_BIT_RATE_I2T 参数来指示发起方到目标方比特率 354，并且可以使用 INT_DX_BIT_RATE_T2I 参数来指示目标方到发起方比特率 346。在一个方面中，比特率输出模块 358 可以处理 PSL_REQ 响应。在这个方面中，当接收到有效的 PSL_RES 响应时，比特率输出模块 358 根据 PSL_REQ 的 DSI 参数所指定的比特率来设置 INT_DX_BIT_RATE_I2T，并且根据 PSL_REQ 的 DRI 参数所指定的比特率来设置 INT_DX_BIT_

RATE_T2I。

[0057] 在操作中，通信设备 310 可以向远程 NFC 设备 330 发送参数选择请求消息。远程 NFC 设备 330 可以至少部分地基于包括在参数选择请求消息中的 DSI 值，来确定哪种 NFC RF 技术可以被用于对等通信。例如，在一个方面中，在远程 NFC 设备 330 处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000b）的情况下，则远程 NFC 设备 330 保持针对基于 NFC-A 的对等通信的就绪状态。在另一个示例方面中，在远程 NFC 设备 330 处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为非零值（例如，001b、010b）的情况下，则远程 NFC 设备 330 可以从 NFC-A 就绪状态切换到 NFC-F 就绪状态。在再一个方面中，在远程 NFC 设备 330 处于针对基于 NFC-F 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000b）的情况下，则远程 NFC 设备 330 可以从 NFC-F 就绪状态切换到 NFC-A 就绪状态。在另一个示例方面中，在远程 NFC 设备 330 处于针对基于 NFC-F 的通信的就绪状态，并且 DSI 值被设置为非零值（例如，001b、010b）的情况下，则远程 NFC 设备 330 保持针对基于 NFC-F 的对等通信的就绪状态。

[0058] 继续上面的操作方面，远程 NFC 设备 330 可以用指示对参数选择请求消息的成功接收的响应来对参数选择请求消息进行响应。此后，通信设备 310 的比特率输出模块 358 可以将目标方比特率 354 以及目标方到发起方比特率 356 的值指示为与设备激活过程相关联的输出。

[0059] 因此，公开了一种系统和方法以提供在通信设备 310 与远程 NFC 设备 330 之间的对等通信，其中，在每个方向上可以使用不同的比特率。

[0060] 图 4-6 示出了根据所述主题的各个方面的各种方法。尽管为了简化说明的目的，这些方法被表示成和描述为一系列的动作或顺序步骤，但是应当理解和明白，要求保护的主题并不限于动作的顺序，因为一些动作可能会以不同的顺序发生和 / 或与本文示出和描述的其它动作同时发生。例如，本领域技术人员将会理解和明白，方法能够可替代地表示为一系列相互关联的状态或事件，例如在状态图中。此外，根据要求保护的主题来实施方法可以并不要求所有所示出的动作。此外，应该进一步明白，在下文以及贯穿本说明书中公开的方法能够被存储在一件制品上来实现向计算机传输和转移这些方法。如同本文中所使用的，术语制品意在包括可以从任何计算机可读设备、载体或介质访问的计算机程序。

[0061] 图 4 描绘了根据一个方面的、概念性地示出在通信环境 400 中发起方 NFC 设备 402 和目标方 NFC 设备 404 之间的通信的呼叫流程图。通信环境 400 可以包括发起方 NFC 设备 402 和目标方 NFC 设备 404。

[0062] 在动作 406 处，发起方 NFC 设备可以配置一个或多个与对等模式通信的建立相关联的参数。在一方面中，发起方 NFC 设备可以配置在对等模式通信期间要在通信的每个方向检测中使用的不同的比特率值。如上所述，可以使用 CON_BITR_NFC_DEP_I2T 参数来指示发起方到目标方比特率，并且可以使用 CON_BITR_NFC_DEP_T2I 参数来指示目标方到发起方比特率。在上面的表 1 中提供了进一步的配置参数。

[0063] 在动作 408 处，作为对等通信链路建立的一部分，发起方 NFC 设备可以向目标方 NFC 设备发送参数选择请求消息。在一个方面中，在动作 406 处所配置的目标方比特率可以被用作发起方发送数据速率 (DSI) 值，并且，在动作 406 处所配置的目标方到发起方比特率可以被用作在参数选择请求（例如，PSL_REQ）消息中的发起方接收数据速率 (DRI) 值。

[0064] 在动作 410 处，目标方 NFC 设备可以解释参数选择请求消息。在一个方面中，目标方 NFC 设备可以基于所接收到的参数选择请求消息中的信息来修改一个或多个配置。例如，在一个方面中，在目标方 NFC 设备 404 处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000b）的情况下，则目标方 NFC 设备 404 可以保持针对基于 NFC-A 的对等通信的就绪状态。在另一个示例方面中，在目标方 NFC 设备 404 处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为非零值（例如，001b、010b）的情况下，则目标方 NFC 设备 404 可以从 NFC-A 就绪状态切换到 NFC-F 就绪状态。在另一个示例方面中，在目标方 NFC 设备 404 处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000）的情况下，那么针对在从发起方到目标方的方向上使用 NFC-A 技术的通信，目标方 NFC 设备 404 可以保持 NFC-A 就绪状态。在再一个示例方面中，在目标方 NFC 设备 404 处于针对基于 NFC-F 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000b）的情况下，则目标方 NFC 设备 404 可以从 NFC-F 就绪状态切换到 NFC-A 就绪状态。在另一个示例方面中，在目标方 NFC 设备 404 处于针对基于 NFC-F 的通信的就绪状态，并且 DSI 值被设置为非零值（例如，001b、010b）的情况下，那么目标方 NFC 设备 404 可以针对基于 NFC-F 的对等通信保持就绪状态。

[0065] 在动作 412 处，目标方 NFC 设备 404 向发起方 NFC 设备 402 发送参数选择响应消息。

[0066] 在动作 414 处，在接收到参数选择响应之后，发起方 NFC 设备 402 可以生成一个或多个输出值。在上面表 2 中提供了输出参数的示例。

[0067] 图 5 描绘了描述示例过程 500 的流程图，在该示例过程 500 中，针对 NFC 对等模式通信在每个方向上可以使用不同的比特率。

[0068] 在框 502 处，目标方 NFC 设备可以接收参数选择请求消息。在一个方面中，参数选择请求消息可以包括用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值，以及用于从目标方 NFC 设备到发起方 NFC 设备的传输的第二比特率值。在一个方面中，第一比特率值和第二比特率值可以是指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、指示 424kbps 的值等。在另一个方面中，第一比特率值可以是发起方发送数据速率 (DSI) 值，第二比特率值可以是在参数选择请求 (PSL_REQ) 消息中的发起方接收数据速率 (DRI) 值。

[0069] 在框 504 处，目标方 NFC 设备可以基于接收到的消息判定是否改变就绪子状态。在目标方 NFC 设备处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000b）的情况下，则在框 506 处，目标方 NFC 设备可以保持针对基于 NFC-A 的对等通信的就绪状态。此外，在目标方 NFC 设备处于针对基于 NFC-A 的通信的就绪状态，并且 DSI 值被设置为非零值（例如，001b、010b）的情况下，则在框 508 处，目标方 NFC 设备可以从 NFC-A 就绪状态切换到 NFC-F 就绪状态。在另一个方面中，在目标方 NFC 设备处于针对基于 NFC-F 的通信的就绪状态，并且 DSI 值被设置为零值（例如，000b）的情况下，则在框 508 处，目标方 NFC 设备可以从 NFC-F 就绪状态切换到 NFC-A 就绪状态。此外，在目标方 NFC 设备处于针对基于 NFC-F 的通信的就绪状态，并且 DSI 值被设置为非零值（例如，001b、010b）的情况下，则在框 506 处，目标方 NFC 设备可以保持针对基于 NFC-F 的对等通信的就绪状态。

[0070] 在框 510 处，目标方 NFC 设备可以发送指示对 PSL_RQ 消息的成功接收的参数选择

响应（例如，PSL_RES）消息。

[0071] 在一个可选的方面中，在框512处，基于在PSL_REQ消息中所接收的值，目标方NFC设备和发起方NFC设备可以针对从发起方NFC设备到目标方NFC设备的传输使用第一比特率，以及针对从目标方NFC设备到发起方NFC设备的传输使用第二比特率，来执行对等模式通信。

[0072] 图6描绘了描述另一个示例过程600的流程图，在该示例过程600中，针对NFC对等模式通信在每个方向上可以使用不同的比特率。

[0073] 在框602处，发起方NFC设备确定将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率以及将用于从目标方NFC设备到发起方NFC设备的传输的第二比特率。在一个方面中，第一比特率值和第二比特率值可以是指示保持当前设置的比特率的值、指示106kbps的值、指示212kbps的值、指示424kbps的值等。

[0074] 在框604处，发起方NFC设备可以在参数选择请求消息中向目标方NFC设备发送第一比特率值和第二比特率值。在另一个方面中，在参数选择请求(PSL_REQ)命令中，第一比特率值可以是发起方发送数据速率(DSI)值，第二比特率值可以是发起方接收数据速率(DRI)值。

[0075] 在一个可选的方面中，在框606处，发起方NFC设备可以从目标方NFC设备接收参数选择响应（例如，PSL_RES）。

[0076] 在另一个可选的方面中，发起方NFC设备可以生成第一输出参数作为第一比特率值并生成第二输出参数作为第二比特率值，其中，该第一输出参数指示用于从发起方NFC设备到目标方NFC设备的传输的当前比特率，该第二输出参数指示用于从目标方NFC设备到发起方NFC设备的传输的当前比特率。

[0077] 在该可选的方面中，在框610处，可以提供所生成的输出参数以便在与对等模式通信的建立相关联的一个或多个其它过程（例如，解析过程）中使用。

[0078] 虽然参照图3，但现在也转向图7，示出了通信设备700的示例架构。如图7中所描绘的，通信设备700包括接收机702，该接收机702从例如接收天线（未示出）接收信号，对接收到的信号执行典型的操作（例如，滤波、放大、下变频等），并且数字化调整后的信号以获得采样。接收机702可以包括解调器704，该解调器704可以解调接收到的符号，并且将它们提供给处理器706用于信道估计。处理器706可以是专门用于分析由接收机702所接收的信息和/或生成由发射机720发送的信息的处理器、用于控制通信设备700的一个或多个部件的处理器、和/或用于既分析由接收机702所接收的信息，生成由发射机720发送的信息，又控制通信设备700的一个或多个部件的处理器。另外，可以准备信号用于经由调制器718来由发射机720发送，该调制器718可以对由处理器706处理的信号进行调制。

[0079] 通信装置700可以还包括存储器708，该存储器708可操作地耦合到各种部件，例如但不限于处理器706，以及能够存储要发送的数据、接收到的数据、与可用信道有关的信息、TCP流、与所分析的信号和/或干扰强度相关联的数据，与所分配的信道有关的信息、功率、速率等，以及用于在NFC对等模式连接建立中进行协助的任何其它合适的信息。

[0080] 进一步，处理器706、设备主机734、NFCC 730、和/或NFC对等通信模块760能够提供：用于接收参数选择请求的模块，该参数选择请求包括：将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将用于从目标方NFC设备到发起方NFC设备的传

输的第二比特率值；以及用于基于第一比特率值在第一目标方子状态或第二目标方子状态中运行的模块。第一目标方子状态可以与基于第一 NFC RF 技术的对等通信相关联。第二目标方子状态可以与基于第二 NFC RF 技术的对等通信相关联。

[0081] 更进一步地，处理器 706、设备主机 734、NFCC 730、和 / 或 NFC 对等通信模块 760 能够提供：用于确定将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从目标方 NFC 设备到发起方 NFC 设备的传输的第二比特率值的模块；以及用于在参数选择请求消息中向目标方 NFC 设备发送第一比特率值和第二比特率值的模块。

[0082] 应当明白，本文所描述的数据存储设备（例如，存储器 708）可以是易失性存储器或非易失性存储器，或可以同时包括易失性存储器和非易失性存储器。通过举例说明而非限制的方式，非易失性存储器可以包括只读存储器 (ROM)、可编程 ROM(PROM)、电可编程 ROM(EPROM)、电可擦除 PROM(EEPROM)、或闪存存储器。易失性存储器可以包括作为外部高速缓存存储器的随机存取存储器 (RAM)。通过举例说明而非限制的方式，RAM 可以有许多形式，例如同步 RAM(SRAM)、动态 RAM(DRAM)、同步 DRAM(SDRAM)、双倍数据率 SDRAM(DDR SDRAM)、增强型 SDRAM(ESDRAM)、同步链接 DRAM(SLDRAM)、以及直接 Rambus RAM(DRRAM)。主题系统和方法的存储器 708 可以包括但不限于这些以及任何其它合适的类型的存储器。

[0083] 通信设备 700 可以包括 NFC 控制器 730。在一个方面中，NFCC 730 可以包括 RF 发现模块 732。RF 发现模块 732 可操作以使用 RF 发现循环作为发现过程的一部分执行 RF 发现来实现对等模式通信。DH 734 可操作以生成命令，以促使 NFCC 730 来执行各种 NFC 动作，例如但不限于 RF 发现等。

[0084] 在另一个方面中，通信设备 700 可以包括 NCI 750。在一个方面中，NCI 750 可操作以实现具有 NFC 能力的天线（例如，702、720）、NFC 控制器 730 与 DH 734 之间的通信。NCI 750 可操作以运行在监听模式和 / 或轮询模式中。在被动通信模式通信期间，无论通信设备 700 以哪种模式开始对等通信，都会在该对等通信期间保持该模式。在主动通信模式通信期间，通信设备 700 可以在对等通信链路期间切换监听模式和轮询模式责任。

[0085] 在另一个方面中，通信设备 700 可以包括 NFC 对等通信模块 760。NFC 对等通信模块 760 可操作以实现用于对等通信的各种模式和 / 或配置。在一个方面中，NFC 对等通信模块 760 可以包括比特率配置模块 762，该比特率配置模块 762 可操作以配置对等模式通信，在该对等模式通信中在每个方向上可以使用不同的比特率。在一个方面中，比特率配置模块 762 可以配置发起方到目标方比特率 764 和目标方到发起方比特率 766。在一个方面中，发起方到目标方比特率 764 与目标方到发起方比特率 766 可以是相同的。在另一个方面中，比特率配置模块 762 可以用促使通信设备 700 维持当前值（例如，默认的比特率）的值，来配置目标方比特率 764 和目标方到发起方比特率 766。例如，当通信设备处于支持基于 NFC-F RF 技术的通信的就绪状态时，可以使用 424 千比特每秒 (kbps) 的默认值。在另一个方面中，比特率配置模块 762 可以用促使通信设备 700 使用一个或多个比特率选项的值，来配置目标方比特率 764 以及目标方到发起方比特率 766。例如，不同的比特率选项可以包括但不限于：106kbps、212kbps、424kbps 等。

[0086] 在一个方面中，NFC 对等通信模块 760 可以包括比特率模块 770，该比特率模块 770 可操作以确定用于来自发起方 NFC 设备的通信以及用于到发起方 NFC 设备的通信的比特率。在一个方面中，可以为比特率模块 770 提供针对 NFC 对等模式通信在每个方向上使用

的不同比特率值。

[0087] 在另一个方面中，NFC 对等通信模块 760 可操作以执行参照图 4-6 所描述的一个或多个过程中的任何一个过程。

[0088] 此外，通信设备 700 可以包括用户接口 740。用户接口 740 可以包括：输入装置 742，该输入装置 742 用于生成对通信设备 700 的输入；以及输出装置 744，该输出装置 744 用于生成由通信设备 700 的用户使用的信息。例如，输入装置 742 可以包括诸如键或键盘、鼠标、触摸屏显示器、麦克风等的装置。进一步，例如，输出装置 744 可以包括显示器、音频扬声器、触觉反馈装置等。在所说明的多个方面中，输出装置 744 可以包括可操作以呈现图像或视频格式的媒体内容的显示器或用于呈现音频格式的媒体内容的音频扬声器。

[0089] 图 8 描绘了根据一个方面的示例性通信系统 800 的框图，该示例性通信系统 800 可操作以能够针对 NFC 对等通信指定在每个方向上的不同的比特率。例如，系统 800 可以至少部分地位于通信设备（例如，通信设备 700）之中。但是应当明白，系统 800 被表示为包括多个功能块，这些功能块可以是表示由处理器、软件、或它们的组合（例如，固件）所实现的功能的功能块。系统 800 包括能够联合运作的多个电子部件的逻辑成组 802。

[0090] 例如，逻辑成组 802 能够包括可以提供用于由目标方 NFC 设备接收参数选择请求的模块的电子部件 804，该参数选择请求包括：将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从目标方 NFC 设备到发起方 NFC 设备的传输的第二比特率值。在一个方面中，第一比特率值和第二比特率值分别可以包括诸如但是不限于下列各项的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、指示 424kbps 的值等等。在另一个方面中，第一比特率值可以是 DSI 值，并且第二比特率值可以是 DRI 值。

[0091] 进一步，逻辑成组 802 能够包括可以提供用于基于第一比特率值而在第一目标方子状态或第二目标方子状态中运行的模块的电子部件 806。在一个方面中，第一目标方子状态可以与基于第一 NFC RF 技术的对等通信相关联，并且第二目标方子状态可以与基于第二 NFC RF 技术的对等通信相关联。在另一个方面中，第一目标方子状态和第二目标方子状态可以分别是诸如但不限于 TARGET_A 子状态、TARGET_F 子状态等的子状态。在这样的方面中，TARGET_A 子状态与基于 NFC-A RF 技术的对等通信相关联，并且 TARGET_F 子状态与基于 NFC-F RF 技术的对等通信相关联。

[0092] 此外，在一个可选的方面中，逻辑成组 802 能够包括可以提供用于向发起方 NFC 设备发送参数选择响应（例如，PSL_REQ）的模块的电子部件 808。在一个方面中，可以响应于从发起方 NFC 设备接收到参数选择请求（例如，PSL_REQ）消息来发送参数选择响应消息。

[0093] 此外，系统 800 可以包括存储器 810，该存储器 810 保存用于执行与电子部件 804、806 和 808 相关联的功能的指令，存储被电子部件 804、806、808 使用或获取的数据等等。尽管被示出为在存储器 810 的外部，但是应当理解，电子部件 804、806 和 808 中的一个或多个可以存在于存储器 810 之中。在一个示例中，电子部件 804、806 和 808 可以包括至少一个处理器，或每个电子部件 804、806 和 808 可以是至少一个处理器的对应模块。此外，在补充或替代的示例中，电子部件 804、806 和 808 可以是包括计算机可读介质的计算机程序产品，其中每个电子部件 804、806 和 808 可以与代码相对应。

[0094] 图 9 描绘了根据一个方面的示例性通信系统 900 的框图，该示例性通信系统 900

可操作以能够针对 NFC 对等通信指定在每个方向上的不同的比特率。例如，系统 900 可以至少部分地位于通信设备（例如，通信设备 700）之中。但是应当明白，系统 900 被表示为包括多个功能块，这些功能块可以是表示由处理器、软件、或它们的组合（例如，固件）所实现的功能的功能块。系统 900 包括能够联合运作的多个电子部件的逻辑成组 902。

[0095] 例如，逻辑成组 902 能够包括可以提供用于由发起方 NFC 设备确定将用于从发起方 NFC 设备到目标方 NFC 设备的传输的第一比特率值以及将用于从目标方 NFC 设备到发起方 NFC 设备的传输的第二比特率值的模块的电子部件 904。在一个方面中，第一比特率值和第二比特率值分别可以包括诸如但是不限于下列各项的比特率值：指示保持当前设置的比特率的值、指示 106kbps 的值、指示 212kbps 的值、指示 424kbps 的值等等。在另一个方面中，第一比特率值可以是 DSI 值，并且第二比特率值可以是 DRI 值。

[0096] 此外，逻辑成组 902 能够包括可以提供用于在参数选择请求（例如，PSL_REQ）消息中向目标方 NFC 设备发送第一比特率值和第二比特率值的模块的电子部件 906。

[0097] 进一步，在一个可选的方面中，逻辑成组 902 能够包括可以提供用于从目标方 NFC 设备接收指示对参数选择请求消息的成功接收的参数选择响应（例如，PSL_REQ）的模块的电子部件 908。在一个方面中，可以响应于从发起方 NFC 设备接收到所发送的参数选择请求（例如，PSL_REQ）消息来发送该参数选择响应消息。

[0098] 此外，在另一个可选的方面中，逻辑成组 902 能够包括可以提供用于生成第一输出参数以及第二输出参数的模块的电子部件 910，该第一输出参数指示将用于从发起方 NFC 设备到目标方 NFC 设备的传输的当前比特率作为第一比特率值，该第二输出参数指示将用于从目标方 NFC 设备到发起方 NFC 设备的传输的当前比特率作为第二比特率值。在这样的方面中，用于生成的模块 910 可以进一步包括用于提供第一输出参数和第二输出参数来在解析过程中使用的模块。

[0099] 此外，系统 900 可以包括存储器 912，该存储器 912 保存用于执行与电子部件 904、906、908 和 910 相关联的功能的指令，存储被电子部件 904、906、908、910 使用或获取的数据等等。尽管被示出在存储器 912 的外部，但是应当理解，电子部件 904、906、908 和 910 中的一个或多个可以存在于存储器 912 之中。在一个示例中，电子部件 904、906、908 和 910 可以包括至少一个处理器，或每个电子部件 904、906、908 和 910 可以是至少一个处理器的对应模块。此外，在补充或替代的示例中，电子部件 904、906、908 和 910 可以是包括计算机可读介质的计算机程序产品，其中每个电子部件 904、906、908 和 910 可以与代码相对应。

[0100] 如同在本申请中所用的，术语“部件”、“模块”、“系统”等旨在包括与计算机相关的实体，例如但不限于硬件、固件、硬件和软件的结合、软件、或执行中的软件。例如，部件可以是但不限于是运行在处理器上的过程、处理器、对象、可执行程序，所执行的线程、程序、和 / 或计算机。通过说明的方式，在计算设备上运行的应用和计算设备都可以是部件。一个或多个部件可以位于过程和 / 或所执行的线程之内，并且部件可以位于一台计算机上和 / 或分布在两台或更多台计算机之间。此外，这些部件可以从具有各种数据结构存储在其上的各种计算机可读介质执行。部件可以通过信号的方式通过本地和 / 或远程过程与其它系统进行通信，例如根据具有一个或多个数据分组的信号，所述数据分组例如是来自与本地系统、分布式系统和 / 或跨越例如因特网的网络中的其它部件进行交互的一个部件的数据。

[0101] 此外，本文结合终端描述了各种方面，所述终端可以是有线终端或无线终端。终

端也可以被称为系统、设备、用户单元、用户站、移动站、移动装置、移动设备、远程站、移动装备 (ME)、远程终端、接入终端、用户终端、终端、通信设备、用户代理、用户设备或用户装备 (UE)。无线终端可以是蜂窝电话、卫星电话、无绳电话、会话发起协议 (SIP) 电话、无线本地环路 (WLL) 站、个人数字助理 (PDA)、具有无线连接能力的手持设备、计算设备或连接到无线调制解调器的其它处理设备。此外，本文结合基站描述了各种方面。基站可以被用于与无线终端进行通信，并且也可以被称为接入点、节点 B 或一些其它术语。

[0102] 此外，术语“或”旨在意指包含性的“或”，而不是排他性的“或”。也就是说，除非另有规定或从上下文中能够明确，否则短语“X 使用 A 或 B”旨在意指任何自然的包含的排列。也就是说，下列实例中的任何一个都满足短语“X 使用 A 或 B”：X 使用 A、X 使用 B、或 X 使用 A 和 B 两者。此外，如同在本申请和所附的权利要求中所使用的，冠词“一 (“a”或“an”)”一般应解释为意指“一个或多个”，除非另有规定或从上下文中能够明确指向单数形式。

[0103] 本文所描述的技术可以被用于诸如 CDMA、TDMA、FDMA、OFDMA、SC-FDMA 以及其它系统的各种无线通信系统。术语“网络”和“系统”经常可交换使用。CDMA 网络可以实现诸如通用陆地无线接入 (UTRA)、cdma2000 等的无线技术。UTRA 包括宽带 CDMA(W-CDMA) 以及 CDMA 的其它变体。进一步，cdma 2000 涵盖 IS-2000、IS-95 和 IS-856 标准。TDMA 网络可以实现诸如全球移动通信系统 (GSM) 的无线技术。OFDMA 网络可以实现诸如演进型 UTRA(E-UTRA)、超移动宽带 (UMB)、IEEE 802.11(Wi-Fi)、IEEE 802.16(WiMAX)、IEEE 802.20、Flash-OFDMA 等的无线技术。UTRA 和 E-UTRA 是通用移动电信系统 (UMTS) 的一部分。3GPP 长期演进 (LTE) 是 UMTS 的使用 E-UTRA 的版本，E-UTRA 在下行链路上使用 OFDMA 并在上行链路上使用 SC-FDMA。在来自名为“第三代合作伙伴计划”(3GPP) 的组织的文档中描述了 UTRA、E-UTRA、UMTS、LTE 和 GSM。此外，在来自名为“第三代合作伙伴计划 2”(3GPP2) 的组织的文档中描述了 cdma 2000 和 UMB。进一步，这样的无线通信系统可以还包括经常使用非成对无许可频谱的对等 (例如，移动对移动) 自组织网络系统、802.xx LAN、蓝牙、近场通信 (NFC-A、NFC-B、NFC-F 等) 以及任何其它短或长距离无线通信技术。

[0104] 依据可以包括大量设备、部件、模块等的系统来呈现各种方面或特征。应该理解和明白，各种系统可以包括额外的设备、部件、模块等，和 / 或可以不包括结合附图所讨论的所有的设备、部件、模块等。也可以使用这些方法的组合。

[0105] 被设计来执行本文所描述的功能的通用处理器、数字信号处理器 (DSP)、专用集成电路 (ASIC)、现场可编程门阵列 (FPGA) 或其它可编程逻辑器件、分立门或晶体管逻辑器件、分立硬件部件或它们的任意组合，可以实现或执行结合本文所公开的多个方面所描述的各种说明性的逻辑、逻辑块、模块和电路。通用处理器可以是微处理器，但是，在替代方案中，该处理器可以是任何常规的处理器、控制器、微控制器、或状态机。也可以将处理器实现为计算设备的组合，例如，DSP 和微处理器的组合、多个微处理器、与 DSP 内核结合的一个或多个微处理器，或任何其它这种配置。此外，至少一个处理器可以包括可操作以执行上述步骤和 / 或动作中的一个或多个的一个或多个模块。

[0106] 进一步，结合本文的公开的多个方面所描述的方法或算法的步骤可和 / 或动作直接体现为硬件、由处理器执行的软件模块或上述两者的组合。软件模块可以位于 RAM 存储器、闪存存储器、ROM 存储器、EPROM 存储器、EEPROM 存储器、寄存器、硬盘、可移动磁盘、CD-ROM、或本领域已知的任何其它形式的存储介质中。示例性的存储介质可以被耦合到处

理器，从而使处理器能够从该存储介质读取信息，并且可向该存储介质写入信息。可替换地，存储介质可以是处理器的组成部分。此外，在一些方面中，处理器和存储介质可以位于 ASIC 中。另外，ASIC 可以位于用户终端中。可替换地，处理器和存储介质也可以作为分立部件位于用户终端中。此外，在一些方面中，方法或算法的步骤和 / 或动作可以作为一个代码和 / 或指令，或代码和 / 或指令的任意组合或集合，位于机器可读介质和 / 或计算机可读介质上，所述机器可读介质和 / 或计算机可读介质可以被并入计算机程序产品。

[0107] 在一个或多个方面中，可以用硬件、软件、固件、或它们的任意组合来实现所描述的功能。如果用软件实现，则可以将功能作为一个或多个指令或代码存储在计算机可读介质上或在计算机可读介质上发送。计算机可读介质包括计算机存储介质和通信介质，所述通信介质包括有助于将计算机程序从一个地点传输到另一个地点的任何介质。存储介质可以是能够被计算机访问的任何可用介质。通过举例说明而非限制的方式，这种计算机可读介质可以包括 RAM、ROM、EEPROM、CD-ROM 或其它光盘存储器、磁盘存储器或其它磁性存储设备、或能够用于携带或存储具有指令或数据结构形式的所期望的程序代码并能够由计算机访问的任何其它介质。此外，可以把任何连接称为计算机可读介质。例如，如果使用同轴电缆、光纤线缆、双绞线、数字用户线 (DSL)、或诸如红外线、无线电和微波的无线技术，从网站、服务器、或其它远程源发送软件，那么，同轴电缆、光纤线缆、双绞线、DSL、或诸如红外线、无线电和微波的无线技术包含在介质的定义中。如本文中所使用的，磁盘和光碟包括压缩光碟 (CD)、激光光碟、光碟、数字多功能光碟 (DVD)、软盘和蓝光光碟，其中磁盘通常磁性地复制数据，而光碟通常用激光来光学地复制数据。上述各项的组合也应该被包括在计算机可读介质的范围之内。

[0108] 尽管前面的公开内容讨论了说明性方面和 / 或方面，应该指出的是，在不脱离所描述的方面和 / 或由所附的权利要求所限定的方面的范围的情况下，可以进行各种变化和修改。此外，虽然可能以单数形式描述或主张所描述的方面和 / 或方面的元素，除非明确声明限于单数形式，否则设想复数。此外，除非另有声明，否则，任何方面和 / 或方面的全部或一部分可以与任何其它方面和 / 或方面的全部或一部分一起使用。

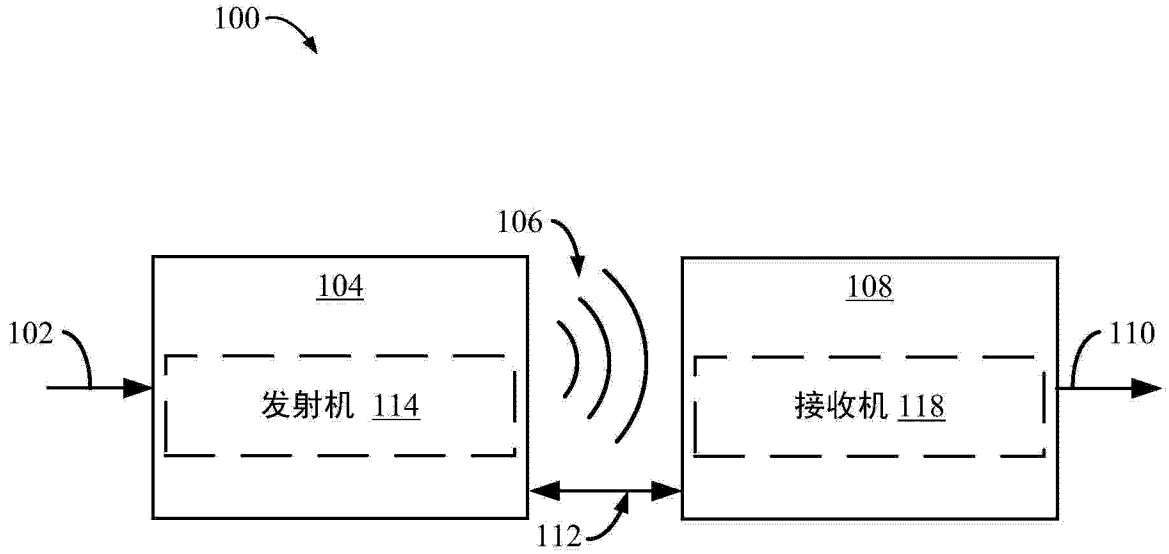

100
106
104
108
102
110
发射机 114
接收机 118
112

图 1

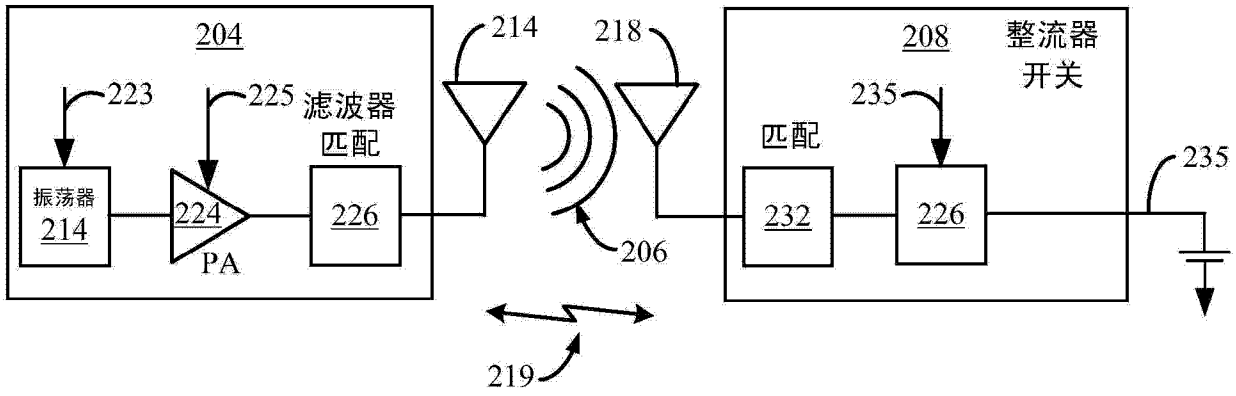

204
214
218
208
整流器
开关
223
225
滤波器
匹配
235
匹配
235
振荡器
214
224
PA
226
232
226
206
219

图 2

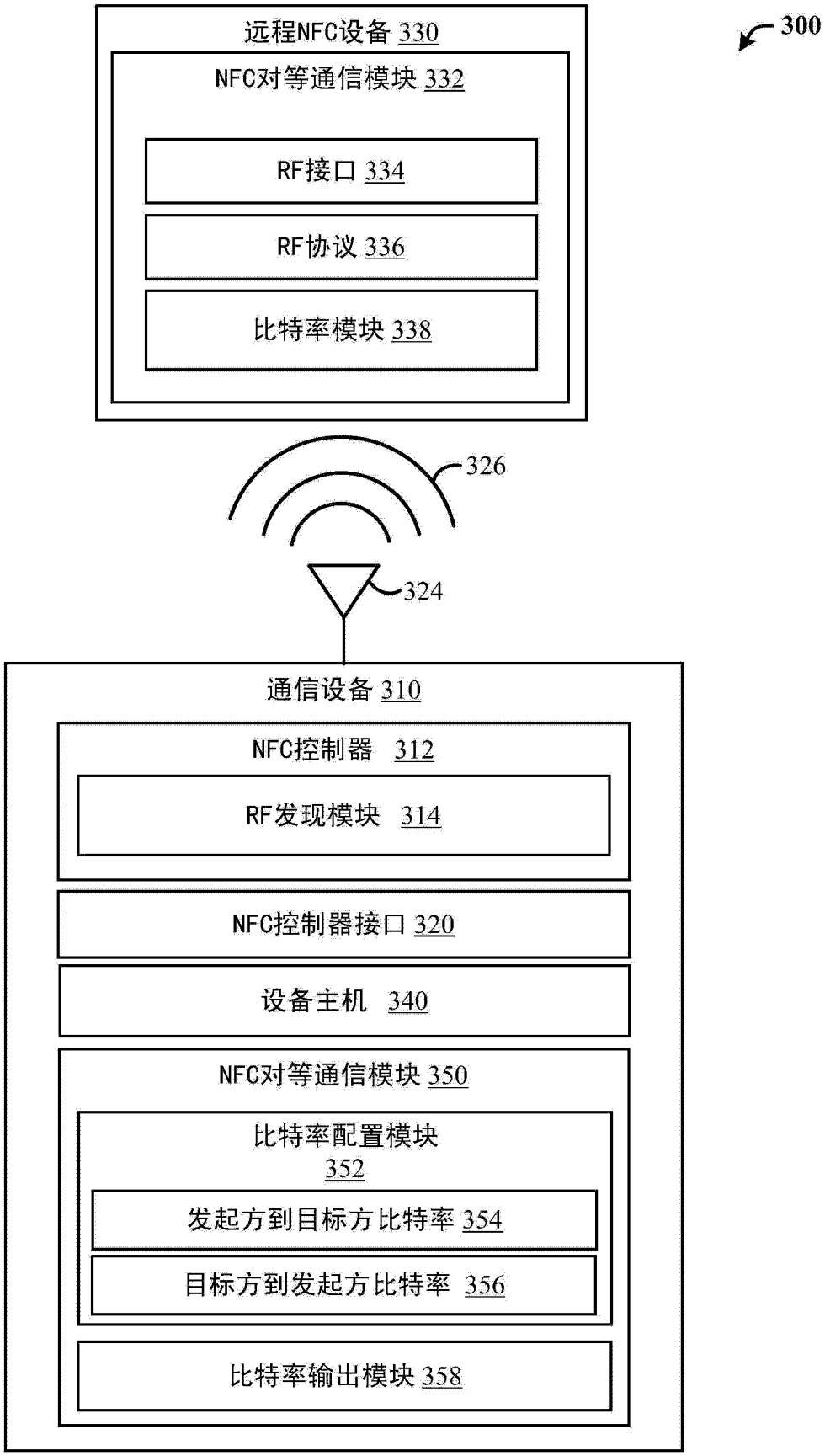

300
远程NFC设备 330
NFC对等通信模块 332
RF接口 334
RF协议 336
比特率模块 338
326
324
通信设备 310
NFC控制器 312
RF发现模块 314
NFC控制器接口 320
设备主机 340
NFC对等通信模块 350
比特率配置模块
352
发起方到目标方比特率 354
目标方到发起方比特率 356
比特率输出模块 358

图 3

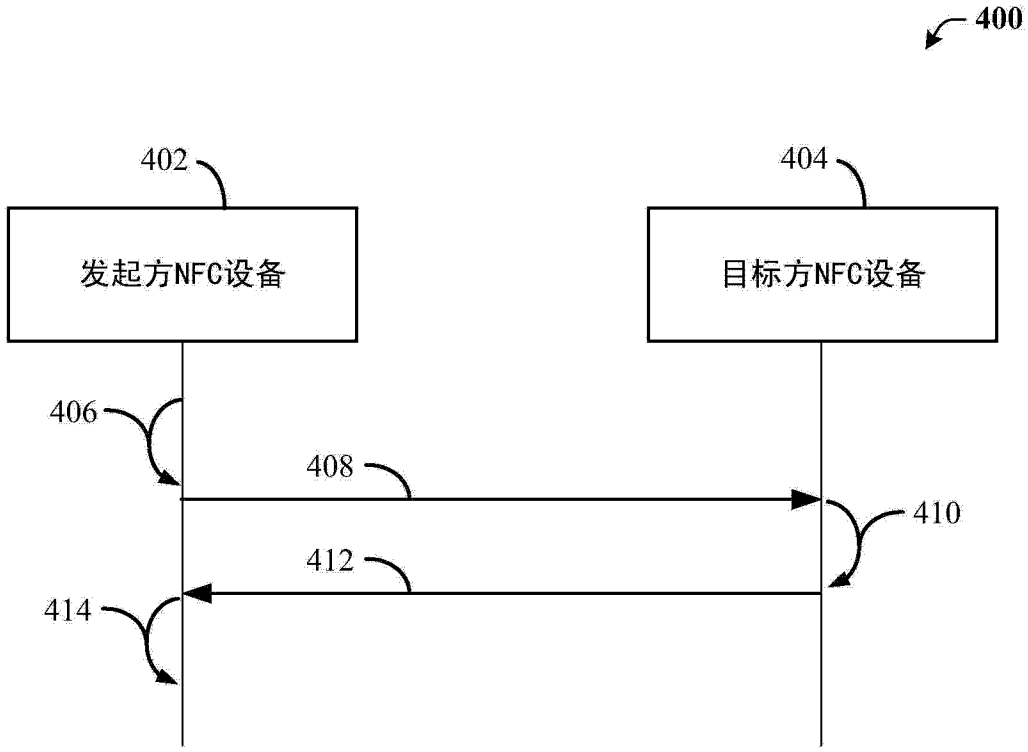


图 4

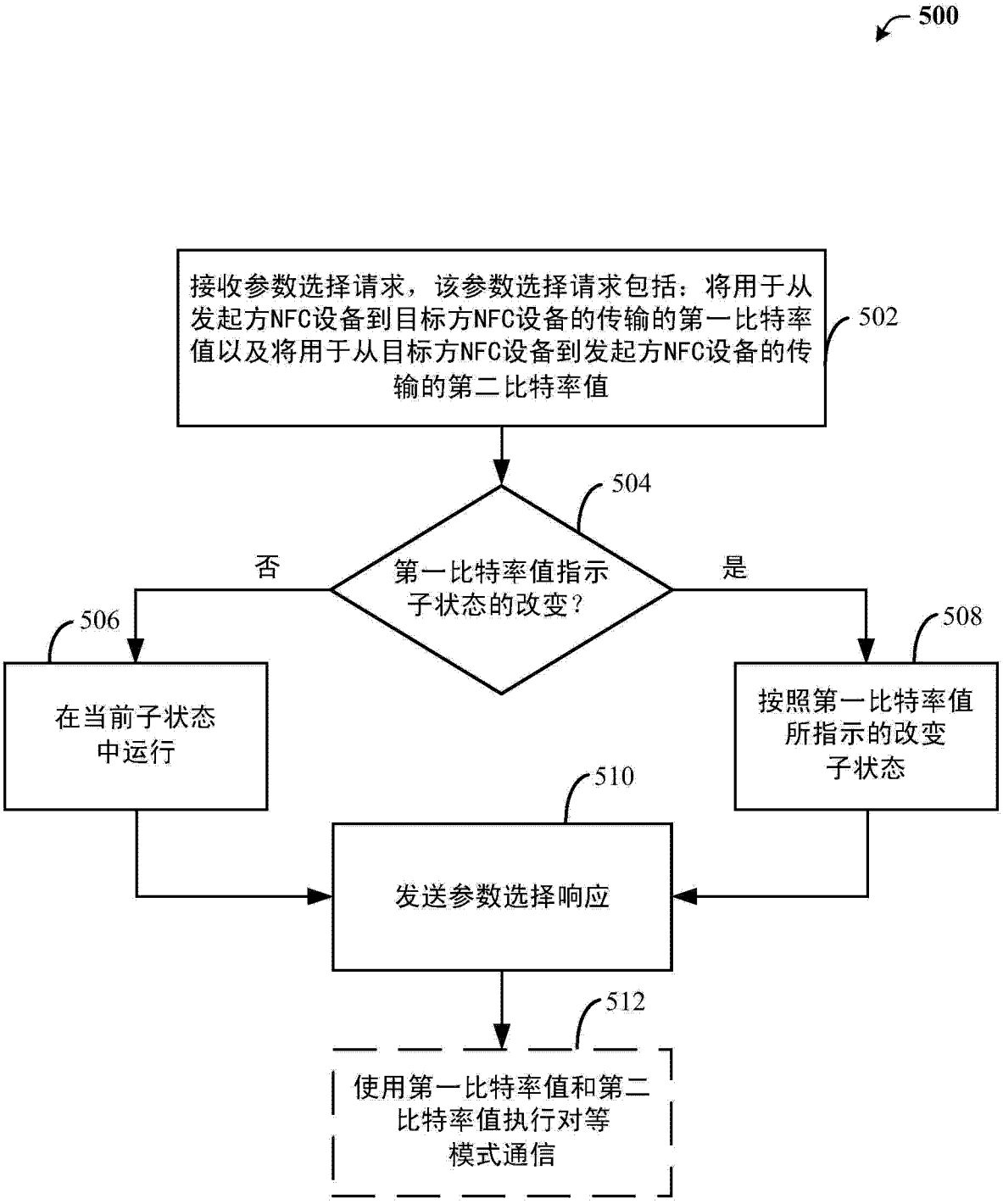

500
接收参数选择请求，该参数选择请求包括：将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将用于从目标方NFC设备到发起方NFC设备的传输的第二比特率值
502
504
第一比特率值指示子状态的改变？
否
是
506
在当前子状态中运行
508
按照第一比特率值所指示的改变子状态
510
发送参数选择响应
512
使用第一比特率值和第二比特率值执行对等模式通信

图 5

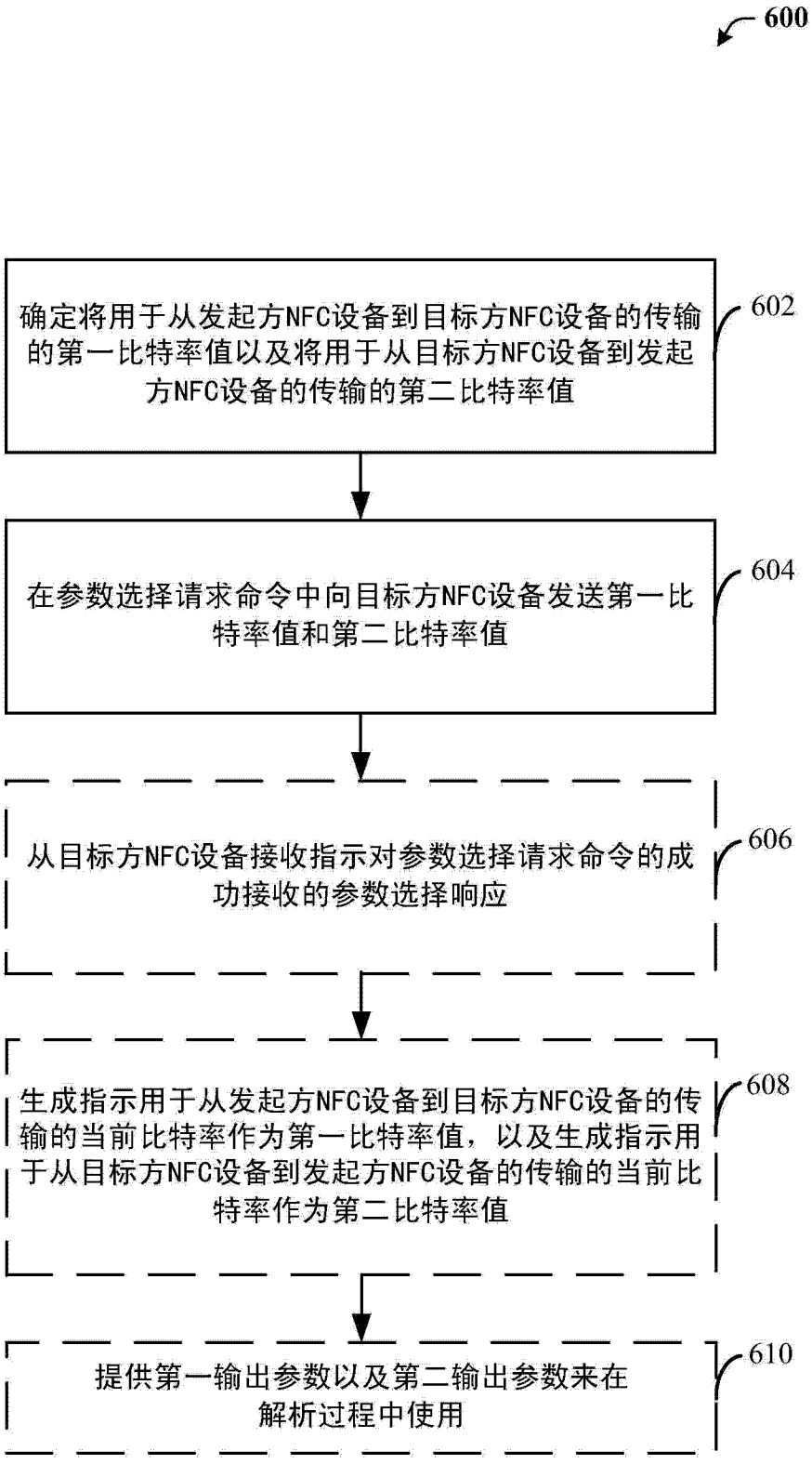

600
确定将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将用于从目标方NFC设备到发起方NFC设备的传输的第二比特率值
602
在参数选择请求命令中向目标方NFC设备发送第一比特率值和第二比特率值
604
从目标方NFC设备接收指示对参数选择请求命令的成功接收的参数选择响应
606
生成指示用于从发起方NFC设备到目标方NFC设备的传输的当前比特率作为第一比特率值，以及生成指示用于从目标方NFC设备到发起方NFC设备的传输的当前比特率作为第二比特率值
608
提供第一输出参数以及第二输出参数来在解析过程中使用
610

图 6

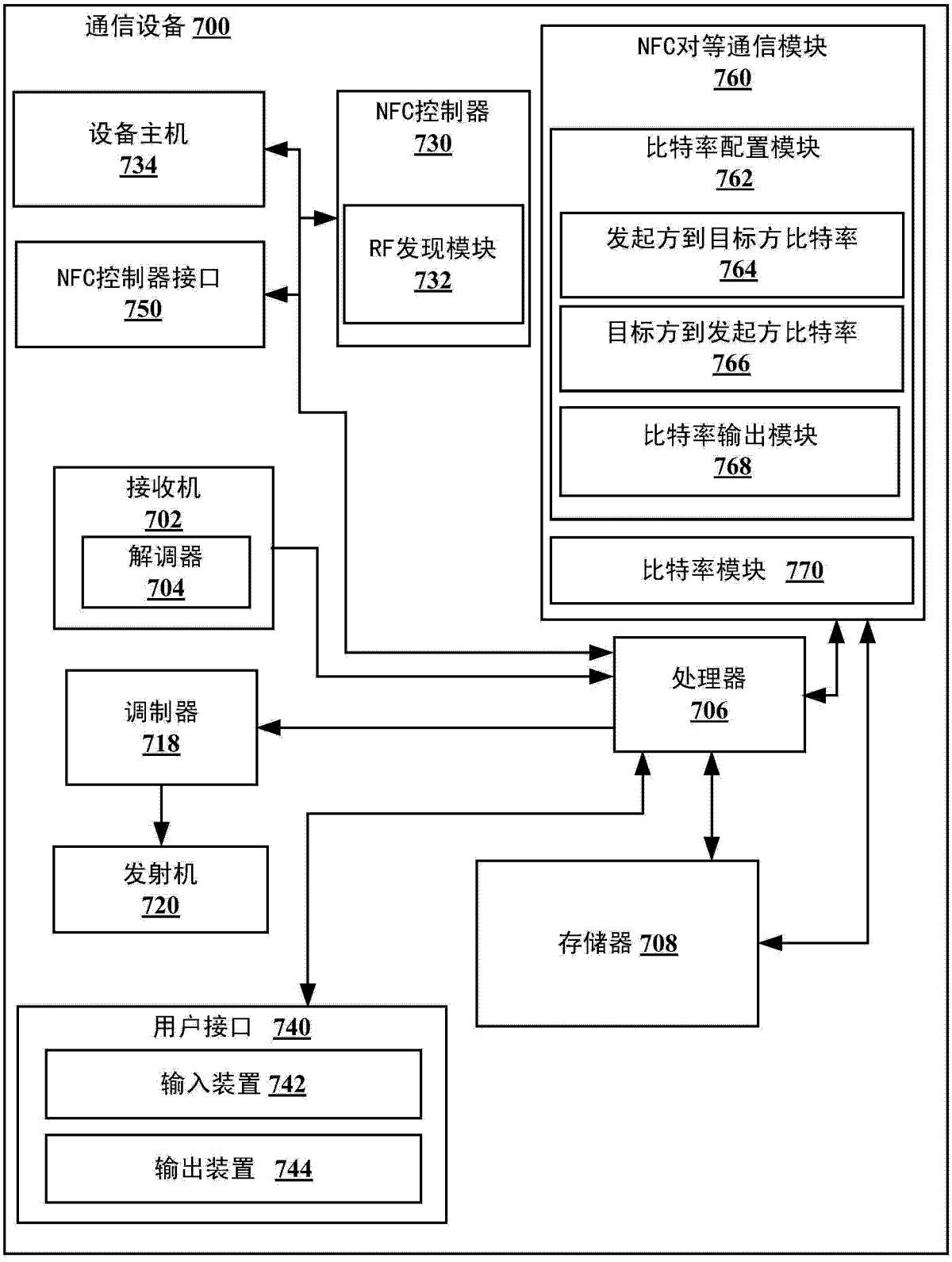

通信设备 700
NFC对等通信模块
760
设备主机
734
NFC控制器
730
比特率配置模块
762
RF发现模块
732
发起方到目标方比特率
764
NFC控制器接口
750
目标方到发起方比特率
766
比特率输出模块
768
接收机
702
解调器
704
比特率模块 770
处理器
706
调制器
718
发射机
720
存储器 708
用户接口 740
输入装置 742
输出装置 744

图 7

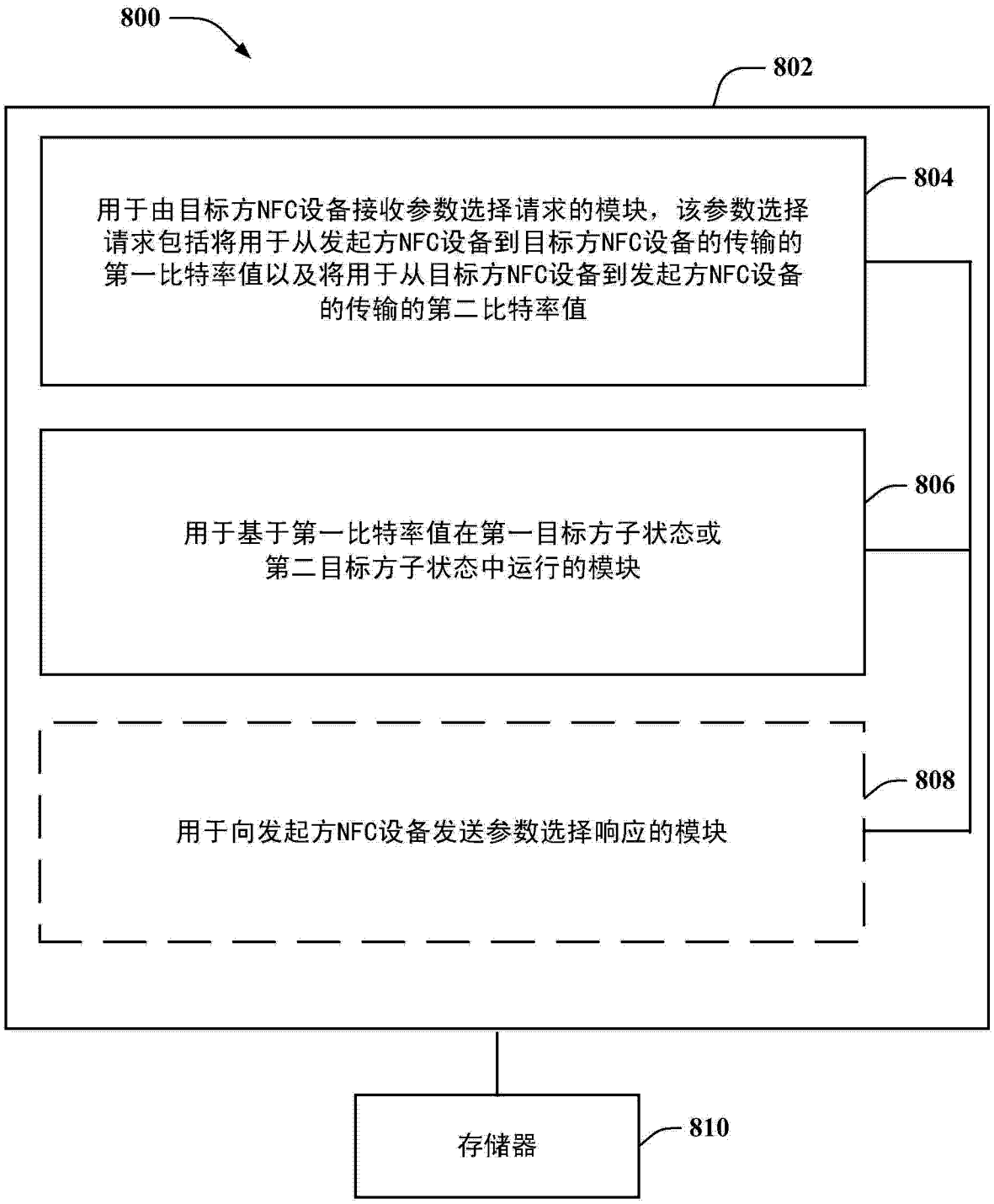

800
802
用于由目标方NFC设备接收参数选择请求的模块，该参数选择请求包括将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将用于从目标方NFC设备到发起方NFC设备的传输的第二比特率值
804
用于基于第一比特率值在第一目标方子状态或第二目标方子状态中运行的模块
806
用于向发起方NFC设备发送参数选择响应的模块
808
存储器
810

图 8

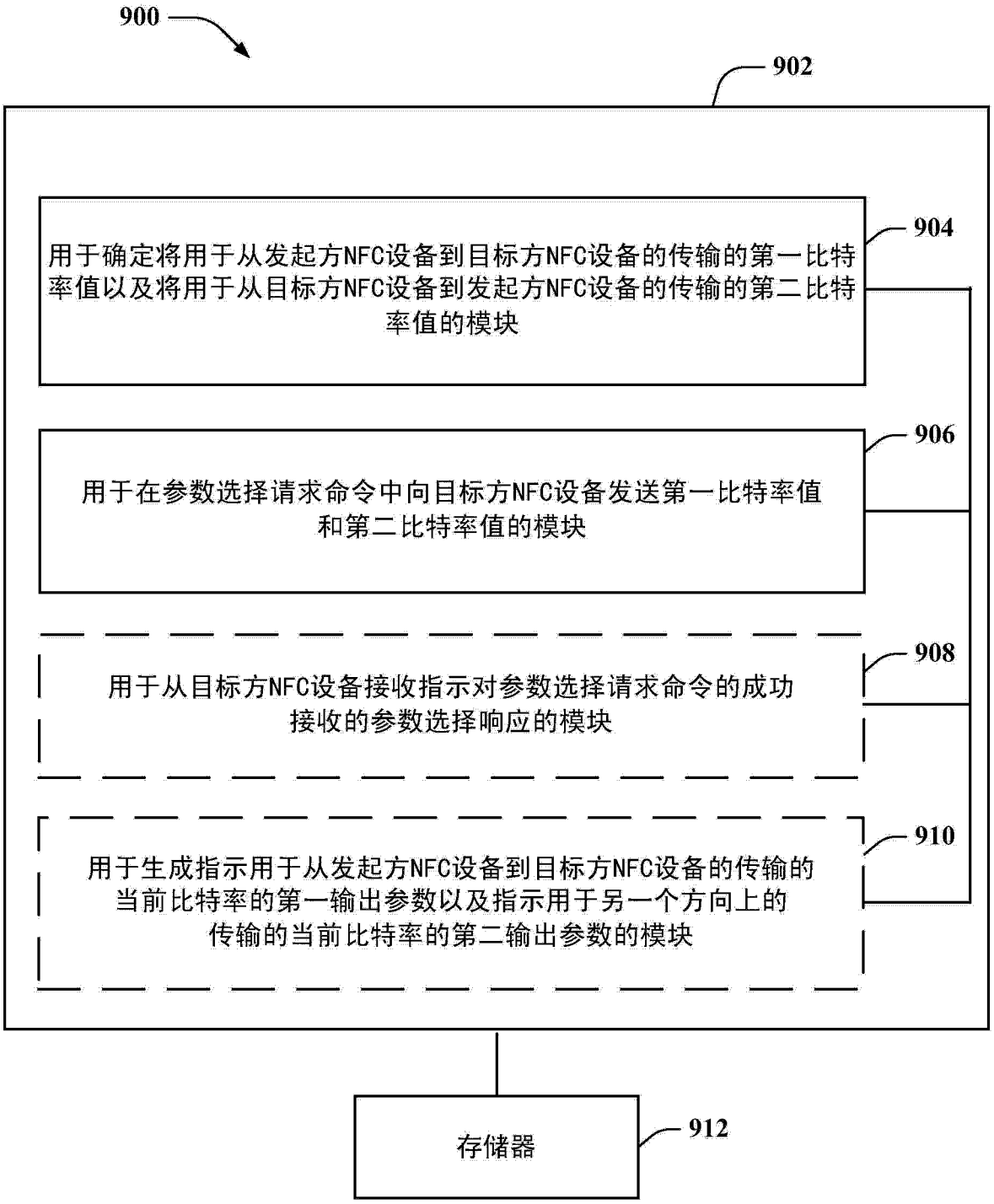

900
902
用于确定将用于从发起方NFC设备到目标方NFC设备的传输的第一比特率值以及将用于从目标方NFC设备到发起方NFC设备的传输的第二比特率值的模块
904
用于在参数选择请求命令中向目标方NFC设备发送第一比特率值和第二比特率值的模块
906
用于从目标方NFC设备接收指示对参数选择请求命令的成功接收的参数选择响应的模块
908
用于生成指示用于从发起方NFC设备到目标方NFC设备的传输的当前比特率的第一输出参数以及指示用于另一个方向上的传输的当前比特率的第二输出参数的模块
910
存储器
912

图 9

Abstract

Aspects disclosed herein relate to enabling specification of different bit rates in each direction for NFC peer communications. In one example, a target NFC device may be configured to receive a parameter selection request including a first bit rate value to be used for transmissions from an initiator NFC device to the target NFC device and a second bit rate value to be used in the other direction, and to function in either a first or a second target sub-state based on the first bit rate value. In another example, an initiator NFC device may be configured to determine a first bit rate value to be used for transmissions from an initiator NFC device to a target NFC device and a second bit rate value to be used in the other direction, and to transmit the first and second bit rate values in a parameter selection request message.