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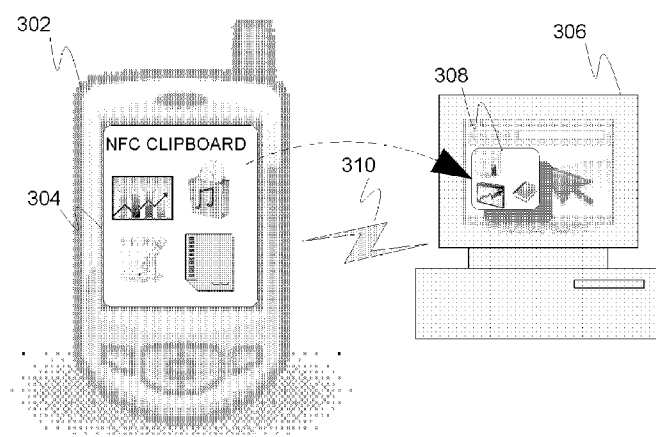


Figure 3

(57) Abstract: An electronic device (202) comprising a processor (220) for processing data, a memory (222) for storing data, and an NFC (near field communication) transceiver (224) for wirelessly transmitting data to and receiving data from a remote device, said device further comprising an NFC clipboard (304, 308), controlled by said processor and stored in said memory, for accommodating a number of user-determined data elements, such as files or other information, as content thereof, wherein the electronic device is configured to transfer NFC clipboard data elements relative to a remote device that may also include an NFC clipboard. At least the initiation of communication between the two devices takes place over the NFC, but the subsequent transfer of the actual contents of the NFC clipboard may be optionally effectuated using a second, e.g. faster, communication technique. A corresponding method is presented.

NEAR FIELD COMMUNICATION CLIPBOARD AND RELATED METHOD

FIELD OF THE INVENTION

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Generally the invention pertains to near field communication (NFC) technologies. In particular, the invention concerns data transfer between NFC compatible apparatuses.

10 BACKGROUND

Communication falling under NFC typically refers to short-range wireless, i.e. contactless, communication following the corresponding standard(s) aimed for simple and safe communication between electronic devices. NFC communication is enabled by bringing two NFC compatible devices within a short distance, e.g. few centimeters, of one another. Contemporary applications of NFC technology are associated with different financial transactions, such as various payment and ticketing services, and simple data access, e.g. data retrieval, solutions. NFC capability may be added to a mobile terminal, a PDA (personal digital assistant), or some other portable or even hand-held device, which can be, and often is, carried along anyway. Technology-wise NFC is typically based on inductive-coupling, which reminds of the technology behind RFID (RF identification) identification tags and transponders. NFC technology is specified in a plurality of standards relative to the applicable hardware components and used data transfer methods. Standards are created, maintained and/or adopted by entities including, but not limiting to, ISO/IEC (International Organization for Standardization / International Electrotechnical Commission), ETSI (European Telecommunications Standards Institute), ECMA (European association for standardizing information and communication systems), GSMA (GSM Association), The Wireless USB Promoter Group and Wi-Fi Alliance. Large conglomerates such as Philips and Sony (e.g. FeliCa) have been active in developing NFC capable devices.

In the context of computer appliances a term 'clipboard' is used to refer to a piece of software that provides at least short term memory. Clipboard's features therefore typically include a capability for both storing data and transferring data within or between different entities, such as text documents or graphical elements, and/or applications. Many users, while accessing their ordinary desktop computer running on e.g. Windows or Mac OS, utilize multi-step actions like cut-and-paste or copy-and-

paste offered by a clipboard utility on daily basis in order to store and transfer data as mentioned hereinbefore. The clipboard may include a graphical user interface wherein the contents thereof may be represented visually as icons, for instance. Different applications may have access thereto in addition to user initiated direct control and access via available UI devices such as a mouse, keyboard, a keypad, separate buttons or switches, a touchscreen etc.

Notwithstanding the various obvious advantages offered by the existing implementations for data transfer between applications, the available solutions are still typically specific to certain application or device, or require rather extensive user intervention in connection with coupling the device(s), initiating the transfer or related tasks, configuring the necessary software, etc.

SUMMARY OF THE INVENTION

- The objective is to alleviate the defects of prior art solutions what comes to the user friendliness and transparency of controlled data management among a plurality of devices.
- The objective is met by a near field communication (NFC) compatible electronic device, a system and a related method each of which utilizing at least one NFC clipboard for conveying information between multiple devices in accordance with the present invention.
- Accordingly, in one aspect an electronic device comprises a processor for processing data, a memory for storing data, and an NFC transceiver for wirelessly transmitting and receiving data relative to a remote device, said device further comprising
- an NFC clipboard, controlled by said processor and stored in said memory, for accommodating a number of user-determined data elements, such as files or other information, as content thereof, wherein the electronic device is configured to wirelessly communicate with a remote device via the NFC transceiver and to subsequently transmit at least part of the content of said NFC clipboard to the remote device, preferably for placement in an NFC clipboard therein, using NFC-compliant wireless data transfer via the NFC transceiver or another implementation of wireless data transfer via an optional second wireless transceiver the electronic device further comprises, in either case the wireless communication between the electronic device

and the remote device being thus at least initiated as NFC communication via the NFC transceiver.

5 In one embodiment the wireless communication between the electronic device and the remote device, including both the initiation of the communication and subsequent transfer of the NFC clipboard content, takes place as NFC communication via the NFC transceiver.

10 In alternative embodiment, the aforementioned communication is again initiated (e.g. hand-shaking) via the NFC but at least part of the subsequent transfer of the NFC clipboard content data and optional supplementary data is continued using a second wireless data communication technique and related transceiver and optional further communication technique supported by both the devices. The second technique may be predetermined or fixed, e.g. application-wise such as for NFC clipboard utility, or remain dynamically configurable and/or selectable, either automatically or manually, from a plurality of options according to the applicable criterion or criteria. The criteria may include at least one criterion element selected from the group consisting of: (fastest) transmission rate, (strongest) field strength, (longest) range, (least) (battery) power consuming, (best) user-ranking, and (lowest) transmission costs. In addition or alternatively, certain data types, e.g. video files, sound files, text files or in more specific domain e.g. "jpg"-files, may have predetermined association with a certain technique. Yet, the size of data to be transferred may be exploited as selection criterion. The second and optional further techniques may include e.g. WLAN (wireless LAN), Bluetooth, Wimax, and/or Zigbee technologies in addition to any other alternatives. Two or more techniques may even be simultaneously utilized for maximizing the aggregate (~overall) transfer rate, for example. Two or more techniques may be alternately applied, optionally based on the fulfillment of a number of criteria such as the ones disclosed above. As a further alternative, the communication could be initiated using the second wireless data communication technique such that at least part of the subsequent transfer of NFC clipboard content is performed using the NFC.

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35 By application of techniques and related standards utilizing a network infrastructure (e.g. 2nd generation mobile networks such as GSM (Global System for Mobile Communications) or 3rd generation mobile networks such as UMTS (Universal Mobile Telecommunication System)), the communication range may be lengthened in real-time since the communication initiation, which typically has rather modest range (using the NFC), to several kilometers, for instance.

Accordingly, in certain embodiments the communication devices may dynamically switch between the used communication techniques even several times after the NFC-based initial communication according to one or more criteria, e.g. the aforementioned criteria.

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In one, either supplementary or alternative, embodiment, the electronic device is further configured to receive at least part of the content of the remote device's NFC clipboard during said NFC-compliant or other wireless information transfer via said
10 NFC or optional further transceiver, respectively, and further configured to store at least portion of the received content in the local NFC clipboard. Therefore, it can be justifiably said that the two devices exchange information utilizing the NFC clipboards.

15 In a further, either supplementary or alternative, embodiment the device is configured to initiate the transfer of NFC clipboard content upon detecting another NFC capable device within NFC communication range. The device may be configured to first initiate NFC communication with another device by utilizing standard NFC communication protocol(s) and, via the communication, recognize the presence of
20 NFC clipboard feature in the remote device, e.g. via a predetermined query or handshaking/negotiation procedure, whereupon the actual NFC clipboard content transfer is started. For instance, the device may inquire, e.g. by a message, from the remote device whether it has the NFC clipboard or it may directly indicate itself to the remote device that the NFC clipboard is supported so that the remote device may act
25 accordingly and optionally confirm or deny the existence of the local NFC clipboard. Alternatively, the device may just initiate NFC clipboard data transfer and optionally monitor whether the remote device acknowledges the received NFC clipboard data, for instance. Additionally, the devices may check identities of the devices and/or device users as a further pre-condition for NFC clipboard data transfer as
30 to be described hereinafter.

In both the embodiments, the overall communication and/or payload data transfer, i.e. NFC clipboard content data transfer may be initiated in response to detecting a triggering condition, which may include one or more conditions selected from the
35 group consisting of: noticing an NFC capable remote device within the NFC range, receiving a data transfer request from the remote device, receiving a NFC data transfer request from a local application or operating system, expiration of a timer, and change in the contents of the local NFC clipboard.

In one further, supplementary or alternative, embodiment the device is configured to check prior to receiving or prior to more permanently storing or positioning an already received data element, whether it, either in identical or somehow otherwise sufficiently similar form, already exists in the local NFC clipboard and/or memory
5 in general.

As one example, it is checked whether a similar element exists according to ID information, such as file name and/or other identifier. Either as a supplementary or alternative solution, one or more other criteria are used to figure out the preceding local
10 existence, such as date of creation, date of last change, size, version code or number (e.g. running number), etc.

If a sufficiently similar element already exists in the local NFC clipboard, the device may be configured to execute at least one action selected from the group consisting of: reject the element, change the ID information of the existing local element such
15 that the received element may be located in the NFC clipboard without naming or other ID conflict, change the ID information of the received element such that the received element may be located in the NFC clipboard without naming or other ID conflict, prompt from the user how to proceed (e.g. deletion of existing or received
20 element and/or renaming and/or local reallocation of element locations), move the local element or the received element to different location (e.g. predetermined folder outside the NFC clipboard or within it).

In a further, either supplementary or alternative, embodiment the NFC clipboard is
25 configured to utilize temporary memory or 'volatile' memory, such as RAM memory, for storing the data elements. Alternatively or additionally, the NFC clipboard may utilize non-volatile memory, e.g. flash memory or a hard disk storage medium, which preserves its status during power down, for instance. The NFC clipboard may allocate memory space, e.g. one memory area or several functionally/logically
30 linked memory areas, dynamically, or it may utilize a predetermined memory space. In case there has been defined a predetermined maximum memory allocation for the NFC clipboard, or only a certain maximum number of simultaneous elements are to be accommodated by the NFC clipboard, the NFC clipboard may utilize FIFO (first in first out) principle or some other mechanism to free memory space and/or ac-
35 commodate only a predetermined number of simultaneous elements, i.e. the oldest element is deleted or at least moved outside the NFC clipboard, e.g. to a predetermined destination such as a folder, when the maximum capacity of NFC clipboard, according to the used criterion or criteria, has been reached and the user is willing to

insert a new element therein. In case a maximum memory allocation has been defined for the NFC clipboard elements instead of or in addition to the defined maximum number of simultaneous elements, and the newest element requires space that is larger than the available space after the removal of the oldest element, further
5 older elements may be removed to free more memory.

In one embodiment, the NFC clipboard may be provided by a dedicated functional element such as an NFC clipboard utility (application) that is executed by said processor and that maintains the clipboard, i.e. memory space with one or more memo-
10 ry areas for carrying the data elements. The utility itself may be stored in a non-volatile memory, e.g. memory chip or storage device such as a hard disk. For execution, the utility may be then loaded into the volatile memory, for example.

Yet, in a further alternative or supplementary embodiment the NFC clipboard in-
15 cludes links to one or more data elements located in the memory. Optionally the elements can be accessed by various applications directly without a need to necessarily proceed via the NFC utility.

In one more embodiment, the NFC clipboard is further adapted to act as a standard
20 clipboard for internal applications' use within the device. In alternative solution, the NFC clipboard exists in parallel with a standard clipboard. The device may be further configured to transfer data between clipboards, either all elements or predetermined elements or element types (e.g. file types, elements associated with a certain application or content, etc).

25 In the context of the present invention, a data element may, for instance, include at least one item selected from the group consisting of: application, application data, a file, configuration information, metadata, e-mail, short message, multimedia message or other message, calendar information, graphics, text, and sound.

30 The electronic device may include at least one element selected from the group consisting of: a hand-held device, a portable device, a mobile terminal, a smart phone, a PDA, a music player, a multimedia player, a peripheral device, a data carrier device, memory device, a still camera, a video camera, a laptop computer, and a desktop
35 computer. The remote device may include corresponding or other elements.

Despite the fact that the electronic device and the "remote device" may, as being physically separate or at least separable devices, be either occasionally or most of the time situated far away from each other, the devices shall be brought within suf-

ficiently close mutual distance, i.e. within range of the NFC technology utilized by the devices, when the NFC clipboard data transfer feature of the present invention is to be initiated. The applicable range of NFC communication may then differ from about direct physical contact between the devices (in which case the distance between the embedded NFC transceivers may still be greater than zero, e.g. few centimeters) to tens of centimeters or more, for instance. Should a second wireless communication technique be used for at least part of the actual transfer of NFC clipboard contents, the distance may be dynamically lengthened during the transfer provided that a longer range is indeed supported by the second technique.

The processor, the memory, the NFC clipboard application, the NFC transceiver, and a further optional wireless transceiver, are at least functionally connected together either directly or via intermediate elements in order to provide the necessary execution, storage, control and data transfer features, respectively, for the NFC clipboard's full-scale utilization in the electronic device. The above and other features of the electronic (and similarly remote) device may be integrated with the device or provided as connectable accessories or modules.

In another aspect of the present invention, an electronic device comprises a processor for processing data, a memory for storing data, and an NFC transceiver for wirelessly transmitting and receiving data relative to a remote device, said device further comprising

an NFC clipboard, controlled by said processor and stored in said memory, for accommodating a number of user-determined data elements, such as files or other information, as content thereof, wherein the electronic device is configured to wirelessly communicate with a remote device via the NFC transceiver and to receive data from the remote device, such as at least part of the content of the remote device's NFC clipboard, during NFC-compliant wireless data transfer via said NFC transceiver or during wireless data transfer via an optional second wireless transceiver the electronic device comprises, in either case the wireless communication being at least initiated as NFC communication via the NFC transceiver, and further configured to include at least portion of the received content in the local NFC clipboard.

In one embodiment, the electronic device is further configured to transmit at least part of the content of said NFC clipboard during NFC-compliant wireless data transfer via the NFC transceiver to a remote device, preferably for placement in an NFC

clipboard of said remote device. Therefore, it can be said that the two devices exchange information utilizing the NFC clipboards.

5 In a further aspect, a system comprising two electronic devices capable of transferring data between the associated NFC clipboards is presented. At least one of devices transmits at least part of the content of the NFC clipboard thereof to the other device that stores at least part of the received content, preferably in its dedicated NFC clipboard. Optionally both the devices may transfer at least part of the content of the local NFC clipboard to the other device, whereby both the devices may further
10 store at least part of the received content in the local NFC clipboard. The devices at least start communicating using NFC but may optionally switch into another wireless communication technique afterwards.

Still, in a further aspect a method for wireless data transfer to be performed by an
15 electronic device comprises:

obtaining an electronic device incorporating a processor for processing data, a memory for storing data, and an NFC transceiver for wirelessly transmitting and receiving data relative to a remote device,
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establishing an NFC clipboard in said electronic device for accommodating a number of user-determined data elements, such as files or other information, as content thereof,

25 communicating with a remote device via the NFC transceiver,

transferring data as NFC-compliant wireless information transfer via the NFC transceiver or as wireless data transfer via an optional second wireless transceiver the electronic device comprises, relative to a remote device, in either case the wireless
30 communication for transferring the data being thus at least initiated as NFC communication via the NFC transceiver, wherein in the case of transmitting data by said electronic device to the remote device said data includes at least part of the existing content of the NFC clipboard of said electronic device, preferably for placement in an NFC clipboard of said remote device, and, in the case of receiving data from said
35 remote device, the received data is included in the NFC clipboard of said electronic device.

The utility of the present invention arises from a plurality of issues. The invention provides an effortless way for transferring data between multiple NFC capable devices for back up, synchronization, and/or other purposes. The implemented feature may therefore be friskily called as, e.g. ‘copy-touch’ (vs. cut/copy-paste), which
5 implies the functionally and mutually interconnectable local NFC clipboards in a plurality of devices. The transfer may be made more or less automated such that upon bringing the devices within range of the NFC communication, the devices may transmit data from and receive data to the local clipboard according to predetermined and/or user-defined NFC clipboard application settings. The communication
10 of the NFC clipboard data may be flexibly initiated upon instance of an additional, predetermined and/or user-defined triggering condition. The triggering condition may imply using e.g. certain ID’s and/or passwords for establishing a trusted relationship, e.g. NFC clipboard –related relationship, between the devices prior to initiating the transfer of NCF clipboard data.

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The term “NFC capable device” refers herein to any device that is enabled to send and/or receive data over NFC. Depending on each use scenario, the device may also be called as an NFC writer, NFC reader, NFC transceiver, a tag, etc.

20 The term “transceiver” refers herein to a transmitter-receiver primarily from a functional standpoint. In one embodiment, as contemplated hereinbefore, the electronic device includes an NFC transceiver for initiating communication relative to a remote device and for transferring NFC clipboard data. In another already reviewed embodiment, the communications may be started as NFC compliant but continued
25 using a second wireless communication technique. In this case the device includes at least functionally a second transceiver, but both it and the NFC transceiver may be hardware-wise implemented via a multi-purpose transceiver arrangement, e.g. sw controllable flexible transceiver circuit arrangement capable of adapting to multiple techniques and/or standards such as at least one NFC standard and one or more optional standards such as WLAN. Each transceiver may still optionally include at
30 least some dedicated hardware and/or software in addition to obviously different air interface parameters. Alternatively, multiple transceivers may be separately implemented in the device, e.g. as dedicated chips, and then at least partially managed for data transfer by a common entity such as the aforementioned processor.

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The term “data transfer” and derivatives thereof may refer herein to transmitting or receiving data, or both, depending on the viewpoint naturally present in connection with each instance of the term. From the standpoint of the sender, transfer is sub-

stantially about transmitting data, whereas from the standpoint of the recipient, the transfer includes mostly receiving data, although in both cases the communication may also be bidirectional. For example, a recipient may send acknowledgements to the sender that receives those while, between, or after sending the data. Data transfer may imply copying data or moving data, i.e. the sent data may remain at the sending party after communication thereof or it may be deleted after the transmission.

In an embodiment of the present invention an NFC capable hand-held apparatus is provided with the NFC clipboard functionality so as to enable facilitated data transfer between other NFC capable devices. Various alternatives, modifications, and supplementary features of the basic scenario are presented as well.

Various embodiments of the present invention are disclosed in the dependent claims.

BRIEF DESCRIPTION OF THE RELATED DRAWINGS

Next the invention is described in more detail with reference to the appended drawings in which

Fig. 1 visualizes some embodiments of an electronic device and a related system in accordance with the present invention

Fig. 2 is block diagram of device internals in accordance with an embodiment of the present invention.

Fig. 3 is an illustration of an NFC clipboard and associated data transfer relative to an electronic device according to an embodiment of the present invention.

Fig. 4 discloses a flow diagram of an embodiment of a method according to the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Figure 1 discloses, by way of example only, a sketch of the concept of the present invention, wherein multiple, i.e. two or more, electronic devices, such as mobile terminals 102, smart phones 104, still or video cameras 106, laptop computers 108, desktop computers 110, peripheral devices 112 like fax/printer/scanner devices or e.g. portable music players or data/memory carrier devices, or PDA's 114 transfer

data between them utilizing NFC communication and NFC clipboard according to the present invention.

The devices 102-114 may be configured such that when at least two of them are located within the range offered by the used NFC technology the contents of the NFC clipboard of one or both devices are updated by transferring data from the NFC clipboard or other part of the memory of a first device to the other part of memory or the NFC clipboard of a second device, respectively, over the NFC or other applicable technology after the initiation of the communication between the devices over the NFC anyway. In another scenario, local NFC clipboards form both the data source at the transmitting device and the data destination at the receiving device. In a further scenario, the data transfer between the NFC clipboards is bidirectional as to the transmitted payload such that both devices send at least part of the contents of local NFC clipboard to the other device.

Connection establishment and/or data transfer may follow the existing NFC and optionally further standards and they may be adapted or supplemented by additional software and/or hardware such that a required level of automation and desired spectrum of features is obtained for the NFC clipboard functionality. As mentioned hereinbefore, the transfer may be initiated in response to detecting a triggering condition. The overall NFC communication process between two devices may be executed in multiple subsequent steps, wherein the communication is first generally started between the first and second devices during which the fulfillment of one or more conditions defines whether the communication process really ever proceeds to a stage associated with the transfer of NFC clipboard(s) payload data in accordance with the present invention. The conditions may be checked by a predetermined negotiation and/or hand-shaking scenario in which the devices exchange information related to the existence of the NFC clipboard functionality and device/user identities, for example. If an alternative communication technique is to be applied for the transfer of NFC clipboard content after communication initiation via the NFC, it may be selected via negotiation at this stage. For instance, either device may publish the supported wireless transfer technologies to the second device, whereupon the second device may select the preferred supported one and informs the first device accordingly. Alternative negotiation procedures may be naturally applied as well as being appreciated by a skilled reader.

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For instance, the NFC applications may be provided with a local database of trusted remote device ID's and/or user ID's so that the NFC clipboard data transfer can be made conditional also on other factors such as the identity of the remote device

and/or device user in addition to mere technological and geographical connectivity and compatibility. Accordingly, a single user may be willing to automatically share the NFC clipboard data only between his own devices such that any other device brought into the vicinity of his (any) NFC device does not automatically trigger the transfer of NFC clipboard data. As another example, a group of users may desire to share the NFC clipboard data, whereby the users may define a group of allowed devices and/or users (e.g. ID's) and store the group data in each NFC capable device in accordance with the present invention for remote device verification procedure prior to starting the transfer. Additionally or alternatively, the database may comprise other conditions for NFC clipboard data transfer. For example, a shared secret such as a password may be used to validate remote parties for data exchange. The secret may be stored in each device such that manual input is not required upon establishing the connection.

With reference to figure 2, an embodiment of the electronic device 202 in accordance with the present invention may comprise at least one processor 220 such as one or more microprocessors, micro-controllers, DSP's (digital signal processor), programmable logic chips, etc. The processor 220 may comprise a plurality of co-operating processors or sub-processors. The processor 220 is configured to execute the code stored in a memory 222, which may imply processing instructions and data relative to the NFC clipboard functionality, e.g. the NFC clipboard application and related memory areas for data elements, and optionally other functionalities such as OS related functionalities, I/O-related functionalities, and other applications. The memory 222 may be divided between one or more physical memory chips or other memory elements, and it may comprise code, e.g. in a form of a computer program/application for the NFC clipboard, and other data. The memory 222 may further refer to and include other storage media such as a preferably detachable memory card, a floppy disc, a CD-ROM, or a fixed storage medium such as a hard drive. The memory 604 may be non-volatile, e.g. ROM, and/or volatile, e.g. RAM, by nature. The UI (user interface) 226 may comprise a display, or a connector to an external display or data projector, and keyboard/keypad or other applicable control input means (e.g. touch screen or voice control input, or separate keys/buttons/knobs) configured so as to provide the user of the device 202 with practicable data visualization and device control means.

In addition, the device 202 comprises an NFC radio part such as an NFC transceiver 224 and optional other wireless or wired data connectivity means such as one or more radio transceivers (GSM, UMTS, WLAN, Bluetooth, infrared, Zigbee, Wi-

max, etc) for communication with other devices such as terminal devices, peripheral devices or network infrastructure(s). It is clear to a skilled person that the device 202 may in practice comprise numerous further functional and/or structural elements for providing various beneficial communication, processing, or other features, whereupon this disclosure is not to be construed as limiting the presence of potential additional elements in any manner.

As mentioned above, the NFC clipboard functionality may be implemented as a software application that is executed by the processor 220. This computer software (product) may be thus provided on a carrier medium such as a memory card, memory stick, an optical disc (e.g. CD-ROM or DVD), or some other memory carrier. The instructions required for implementing the NFC clipboard application may be stored in the carrier medium as executable or in some other, e.g. compressed, format, such that the software may be transported via the carrier medium to a target device and installed therein, e.g. in the hard disk thereof, or executed directly from the carrier medium in the target device by loading the related instructions to the memory 222 of the target device not until execution, for instance.

Fig. 3 illustrates one embodiment and one use scenario of an NFC clipboard and related data transfer. First electronic device 302, such as a mobile terminal or a PDA, and a second electronic device 306, such as a desktop or laptop computer, both comprise own NFC clipboard functionalities that have been visualized in the figure by a maximized application window 304 and a non-maximized application window 308, respectively, each comprising a number of icons representing the corresponding data elements available in the local NFC clipboard. Both the devices 302, 306 have been configured as NFC aware, i.e. their NFC transceivers are set active and the NFC clipboard functionality is turned on. Upon bringing the devices 302, 306 physically close to each other so that the NFC communication commences 310 and potential hand-shaking, device/user verification and/or other procedures are executed, the first device 302 transmits at least part of the contents of the local NFC clipboard 304 to the second device 308 for storage in the NFC clipboard 308 (or optionally some other part of the memory) of the second device, which is highlighted with a unidirectional broken arrow. Correspondingly, the second device 308 may transmit at least part of the contents of the local NFC clipboard 308 to the first device 304. The actual transfer of NFC clipboard contents may occur over the NFC or a further wireless data transfer technology depending on the embodiment as described hereinbefore. The communication between the two devices is nevertheless preferably initiated by the NFC connectivity.

The embodiment has naturally several variations. As one example, first device 302 may be configured to transmit each element present in the local NFC clipboard to second device 306 that may be configured to receive and store or discard the elements autonomously on the basis of local settings as reviewed hereinbefore. Alternatively, only some of the local elements may be transmitted by first device 302, which can be determined by element classifications (e.g. indicators, such as send on/off, which may optionally be remote device-specific) or by a mutual negotiation procedure taking place between the devices 302, 306 prior to the transfer of NFC clipboard data. Namely, first device 302 that is about to transmit NFC clipboard data may first send a listing of elements beforehand to the second device 306 that analyzes the listing through and checks which elements it already has and which not, or which are otherwise not desired according to predetermined criterion, and then informs the first device 302 about the elements not necessary/not preferred to be transferred. In both the embodiments the second device 306 may be configured to check whether it has local data elements in the NFC clipboard or somewhere else in the memory, which are similar to the ones just received (but not yet inserted in the local NFC clipboard) or mentioned in the received listing for near future transfer. If a sufficiently similar element already exists in the local NFC clipboard (or optionally somewhere else in the memory), the device 306 may take one or more actions as described hereinbefore, such as rejecting (discarding) the element, or be configured, in the case of a listing embodiment, to send a message to the first device 302 informing the first device 302 of the listed elements the transfer of which is not necessary. Correspondingly, the second device 306 may inform the first device 302 about data elements to be transferred to the second device 306. The first device 302 may store this information for immediate and optionally future use.

In one variation of the embodiment, device 302, 306 may be configured to maintain NFC clipboard event history such as a log that can be, for example, utilized in differential transfer of NFC clipboard data. The log may be configured to store information relating to previous communication sessions. The information may include the listing of previously communicated data elements relative to each remote device. The device 302, 306 that is about to send the at least part of the contents of the NFC clipboard may then select the elements for the transfer based on the communication history relative to the remote device. For instance, an element that was previously transmitted to the remote device and has not changed ever since is not transferred.

Fig. 4 is a flow diagram of an embodiment of a method according to the present invention. After start-up, at 404 initial actions enabling the execution of the further method steps are performed, i.e. an electronic device that supports NFC communication is obtained. At 406, necessary software such as the NFC clipboard utility may be launched and configured. Should the user of the device desire altering the contents of the NFC clipboard, they may be updated, i.e. elements added, deleted, or modified. The NFC clipboard thus accommodates a number of user-determined data elements, such as files or other information, as content thereof. The data elements of the NFC clipboard may be user-determined in a sense that they have been selected by the user for inclusion in the NFC clipboard one element at a time, i.e. through explicit addition via drag-and-drop operation, for instance, and/or via user-determined inclusion, i.e. special NFC clipboard configuration, rules that may be optionally stored in the device for more automated inclusion of local elements in the NFC clipboard, for example. The elements may have been actually created (e.g. a text document) by the user of the device, but also device-generated (e.g. application-generated) or third party-generated elements may be determined by the user to be included in the NFC clipboard. Additionally, the NFC clipboard may include, as being visible or transparent relative to the user, elements that are selected by the clipboard application itself, e.g. for maintenance data exchange between several instances of NFC application in different devices. Upon detecting an external device with which NFC communication is effectuated 408, which may refer to establishment of NFC communication and optionally e.g. checking the NFC clipboard support, support of further wireless communication technologies and/or identity of the remote device, NFC clipboard contents, either all or at least portion thereof, is transferred at 410 as NFC-compliant or alternative wireless information transfer, wherein in the case of transmitting data by said electronic device to the remote device said data includes at least part of the existing content of the NFC clipboard of said electronic device, preferably for placement in an NFC clipboard of said external device, and, in the case of receiving data from said external device, the received data is preferably included in the NFC clipboard of said electronic device. A device may both transmit and receive NFC clipboard contents. After the initiation 408 of communication between the devices via NFC, the active communication method may be changed at least once as described in the foregoing chapters. The execution of tasks 406, 408, and 410 may be repeated so that the NFC clipboard is maintained up-to-date and the associated data transfer takes place when applicable.

The scope of the invention can be found in the following claims. Notwithstanding the various embodiments described hereinbefore in detail, a person skilled in the art

will appreciate the fact that different modifications may be introduced to the explicitly disclosed solutions without diverging from the fulcrum of the present invention as set forth in this text and defined by the independent claims. Finally, the skilled person will understand that instead of contemporary or future short-range wireless communication methods directly falling under the expanding and evolving family of official NFC standards and variations thereof, supplementary or alternative short-range wireless communication methods and/or technologies (i.e. in practice being other near field communication methods/technologies despite of the used naming convention) could be applied in the context of the present invention and therefore considered as equal to the aforementioned NFC technology for implementing at least the communication initiation and optionally the subsequent NFC clipboard (content) data transfer phases, whereupon the NFC transceiver should be constructed or at least modified accordingly to follow the supplementary or alternative communication practices. The NFC clipboard itself may be implemented as a (higher level) functional entity substantially independent of the used wireless communication technology below.

Claims

1. An electronic device (202) comprising a processor (220) for processing data, a memory (222) for storing data, and a near field communication (NFC) transceiver (224) for wirelessly transmitting and receiving data relative to a remote device, said device further comprising
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an NFC clipboard (304, 308), controlled by said processor and stored in said memory, for accommodating a number of user-determined data elements, such as files or
10 other information, as content thereof,
wherein the electronic device is configured to wirelessly communicate with a remote device via the NFC transceiver and to subsequently transmit at least part of the content of said NFC clipboard to the remote device, preferably for placement in an
15 NFC clipboard therein, using NFC-compliant wireless data transfer via the NFC transceiver or another implementation of wireless data transfer via an optional second wireless transceiver the electronic device further comprises, in either case the wireless communication between the electronic device and the remote device being thus at least initiated as NFC communication via the NFC transceiver.
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2. The electronic device of claim 1, configured to determine whether the remote device supports NFC clipboard utility and optionally whether the identity of the remote device belongs to the number of one or more identities relative to which the transfer of NFC clipboard data is allowed.
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3. The electronic device of any preceding claim, configured to store event history related to NFC clipboard data transfer to and/or from one or more remote devices.
- 30 4. The electronic device of any preceding claim, configured to include user-determined data elements in the NFC clipboard based on user-configurable inclusion rules stored in the electronic device.
- 35 5. The electronic device of any preceding claim, wherein the NFC clipboard is configured to accommodate the data elements using at least one technique selected from the group consisting of: to statically and/or dynamically include one or more memory areas for physically hosting one or more user-determined data elements, and to include links to one or more user-determined data elements.

6. The electronic device of any preceding claim, configured to communicate with the remote device on the selection of data elements for the subsequent NFC clipboard data transfer.

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7. The electronic device of any preceding claim, configured to receive at least part of the content of the remote device's NFC clipboard during the wireless information transfer via said NFC transceiver or said optional second wireless transceiver.

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8. An electronic device (202) comprising a processor (220) for processing data, a memory (222) for storing data, and a near field communication (NFC) transceiver (224) for wirelessly transmitting and receiving data relative to a remote device, said device further comprising

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an NFC clipboard (304, 308), controlled by said processor and stored in said memory, for accommodating a number of user-determined data elements, such as files or other information, as content thereof,

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wherein the electronic device is configured to wirelessly communicate with a remote device via the NFC transceiver and to receive data from the remote device, such as at least part of the content of the remote device's NFC clipboard, during NFC-compliant wireless data transfer via said NFC transceiver or during wireless data transfer via an optional second wireless transceiver the electronic device comprises, in either case the wireless communication being thus at least initiated as NFC communication via the NFC transceiver, and further configured to include at least portion of the received content in the local NFC clipboard.

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9. The electronic device of claim 8, configured to check whether a data element already received or to be received previously exists, either in identical or somehow otherwise sufficiently similar form, in the local NFC clipboard and/or memory in general, and if that is the case, optionally configured to execute at least one action selected from the group consisting of: reject the second, just received or to be received, instance of the same data element, change the ID information of the existing local element such that the received element may be located in the NFC clipboard without naming or other ID conflict, change the ID information of the received element such that the received element may be located in the NFC clipboard without

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naming or other ID conflict, prompt from the user how to proceed, and move the local element or the received element to different location.

10. The electronic device of claim 8 or 9, configured to transmit at least part of
5 the content of the local NFC clipboard during the wireless data transfer via the NFC transceiver or the optional second wireless transceiver to the remote device.

11. The electronic device of any preceding claim, wherein said electronic device
10 includes at least one element selected from the group consisting of: a hand-held device, a portable device, a mobile terminal, a smart phone, a PDA, a music player, a multimedia player, a peripheral device, a data carrier device, memory device, a still camera, a video camera, a laptop computer, and a desktop computer.

12. The electronic device of any preceding claim, comprising said second wireless
15 transceiver for transferring data, such as NFC clipboard content data, after communication initiation with the remote device via the NFC, wherein the second wireless transceiver optionally supports higher transmission rate and/or longer range than the NFC.

20 13. The electronic device of claim 12, being configured to switch into or start using said second wireless transceiver based on at least one criterion selected from the group consisting of: transmission rate, field strength, range, power consumption, user-set preferences, default settings, transmission costs, type of data to be transferred, and size of data to be transferred.

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14. The electronic device of claim 12 or 13, said electronic device being configured to substantially simultaneously apply the NFC and said second wireless transceiver for data transfer.

30 15. A system for exchanging NFC clipboard data via NFC-compliant wireless data transfer, comprising an electronic device of any of claims 1-7 and an electronic device of any of claims 8-10.

16. A method for wireless data transfer to be performed by an electronic device
35 obtained (404) incorporating a processor for processing data, a memory for storing data, and a near field communication (NFC) transceiver for wirelessly transmitting and receiving data relative to a remote device, said method comprising:

establishing (406) an NFC clipboard in said electronic device for accommodating a number of user-determined data elements, such as files or other information, as content thereof,

5 communicating (408) with a remote device via the NFC transceiver,

transferring data (410) as NFC-compliant wireless information transfer via the NFC transceiver or as wireless data transfer via an optional second wireless transceiver the electronic device comprises, relative to a remote device, in either case the wireless communication for transferring the data being thus at least initiated as NFC
10 communication via the NFC transceiver,

wherein in the case of transmitting data by said electronic device to the remote device said data includes at least part of the existing content of the NFC clipboard of said electronic device, preferably for placement in an NFC clipboard of said remote
15 device, and, in the case of receiving data from said remote device, the received data is included in the NFC clipboard of said electronic device.

17. A computer program, comprising code means adapted, when run on a computer
20 such as the electronic device of claim 16, to execute the method steps of claim 16.

18. A carrier medium comprising the computer program of claim 17.

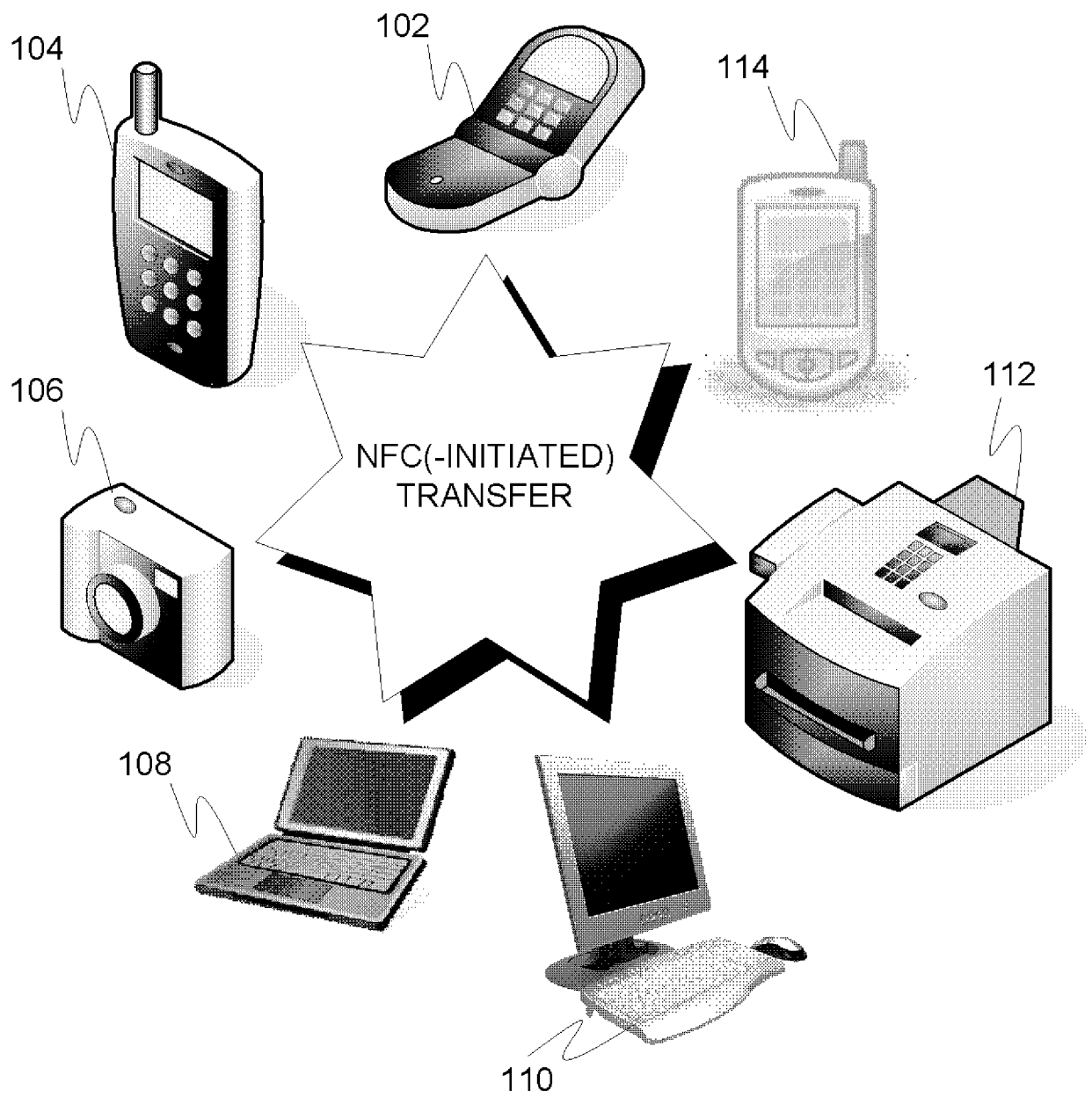


Figure 1

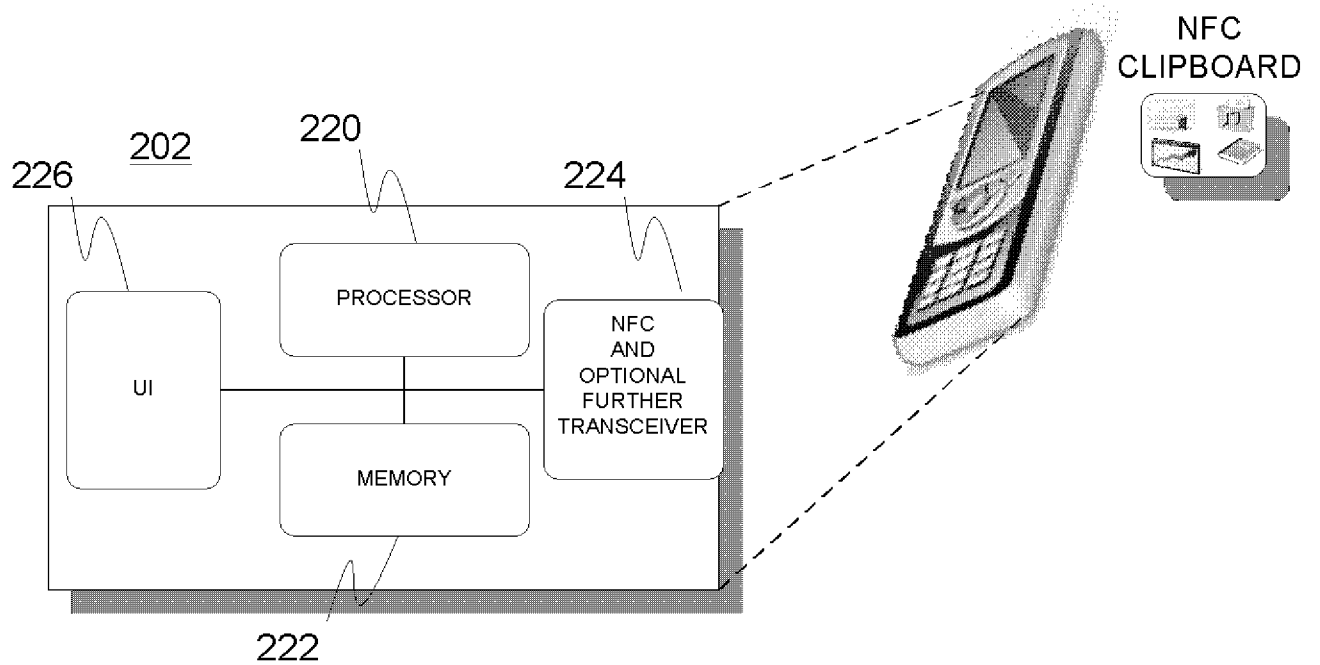


Figure 2

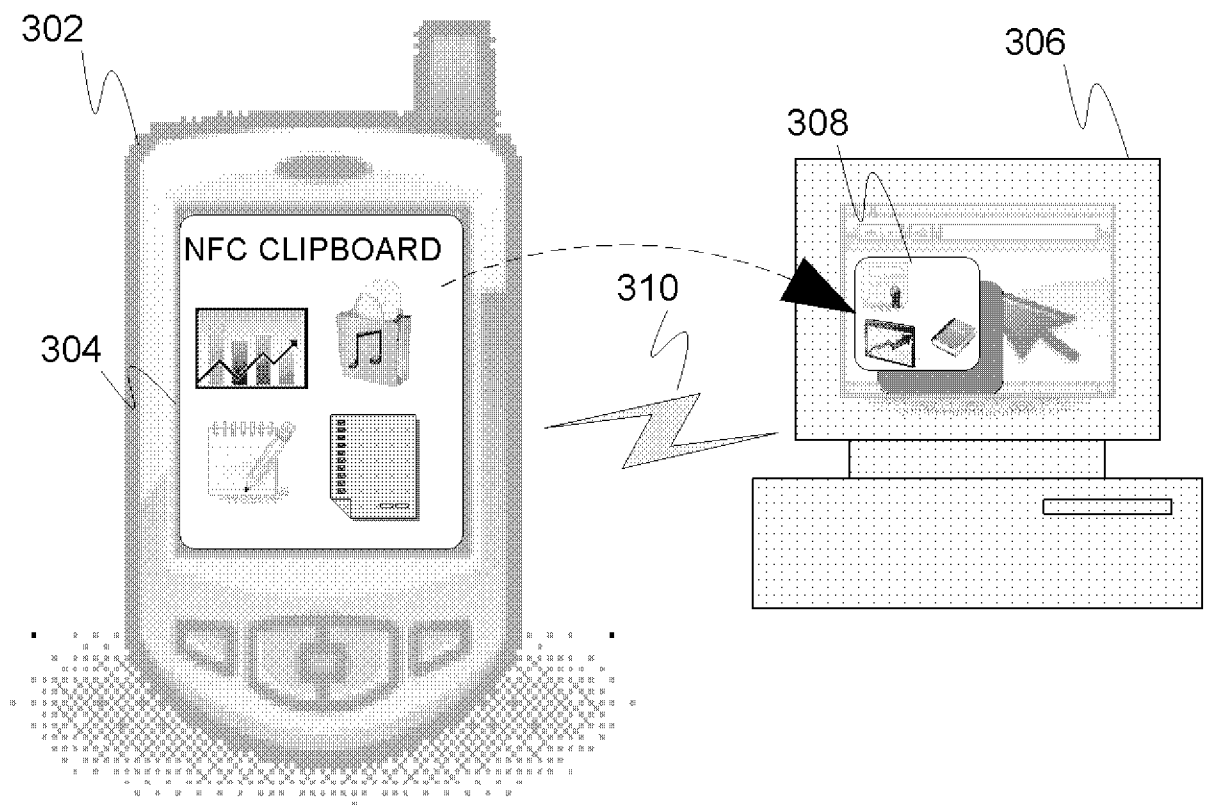


Figure 3

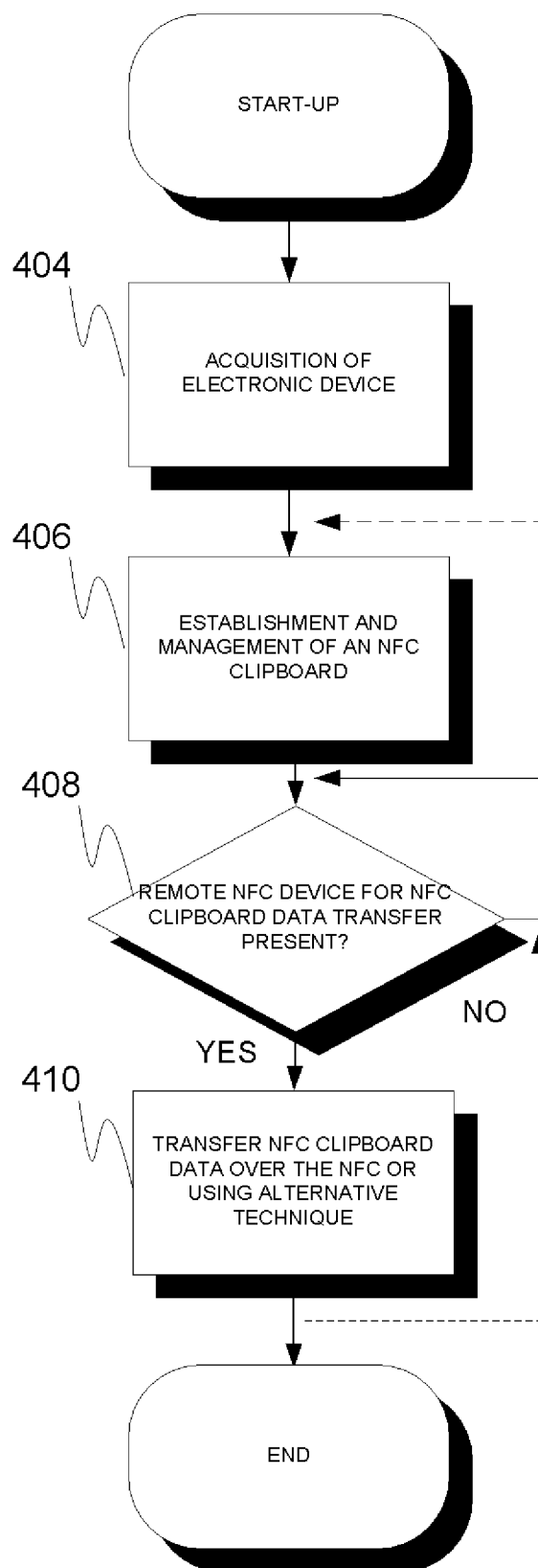


Figure 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2010/050076

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC: G06F, H04M, H04B

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

FI, SE, NO, DK

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

EPO-Internal, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2007112787 A1 (SONY ERICSSON MOBILE COMMUNICATIONS AB) 11 October 2007 (11.10.2007) abstract; page 7, lines 26-31; page 8, lines 18-26; page 10, line 28 – page 13, line 20; Figs. 1 and 2	1-18
Y	WO 2006111782 A1 (NOKIA CORPORATION) 26 October 2006 (26.10.2006) abstract; claims 14, 20; Fig. 1	1-18
Y	WO 2008021032 A2 (MICROSOFT CORPORATION) 21 February 2008 (21.02.2008) paragraphs [0004], [0035]-[0038]	1-18
Y	US 2005004986 A1 (AOKI, N E et al.) 06 January 2005 (06.01.2005) paragraphs [0030], [0031]	1-18
Y	WO 0173674 A2 (INTEL CORPORATION) 04 October 2001 (04.10.2001) abstract; Figs. 1 and 2	1-18

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"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

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	US 2009144435 A1 (NANIYAT, A) 04 June 2009 (04.06.2009) abstract; paragraphs [0022], [0023], [0026], [0028]; claim 1	1-18

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2010/050076

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CLASSIFICATION OF SUBJECT MATTER

Int.Cl.

G06F 9/46 (2006.01)

H04M 1/725 (2006.01)

H04B 5/00 (2006.01)