

**METHOD FOR HANDLING COMMUNICATIONS OVER A NON-
PERMANENT COMMUNICATION LINK**

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based on, and claims benefit of
5 Provisional Patent Application No. 60/672,082 filed April
18, 2005.

FIELD OF APPLICATION

The instant application relates to the field of
communications. More precisely, this application pertains
10 to a method for handling communications over a non-
permanent communication link.

BACKGROUND OF THE ART

Wireless data communication devices are now widespread
due to the fact that they are popular with users.

15 Such wireless data communication devices are usually
provided with a plurality of applications such as an
electronic messaging application, an Internet browser
application, an instant messaging (IM) application, etc.

In use, a wireless data communication device may be
20 located temporarily in a zone where the wireless
connection is not available anymore. The wireless data
communication device is hence out of coverage.

In such case, outbound messages (also referred to as
outgoing messages or messages to transmit) generated from
25 the applications running on the wireless communication
device will therefore become undeliverable to any server.
More precisely, for each outbound message, the
transport/network layer reports individually to each

application that its message transmission failed. The application must then be programmed accordingly to handle such failure.

The skilled addressee will appreciate that such situation
5 creates a large overhead especially in the case where there is a large number of messages to transmit by a plurality of applications.

The skilled addressee will further appreciate that frequent radio communication attempts will significantly
10 reduces the battery life of a wireless data communication device.

There is a need for a method that will overcome at least one of the above-identified drawbacks.

Features of the application will be apparent from review
15 of the disclosure, drawings and description below.

DESCRIPTION OF THE DRAWINGS

In order that the application may be readily understood, embodiments are illustrated by way of example in the accompanying drawings.

20 Figure 1 is a block diagram which shows a system where the method for handling communications over a non-permanent communication link may be advantageously used;

Figure 2 is a block diagram showing a plurality of communication applications communicating with a
25 transport/network layer using a communication management unit in accordance with an embodiment;

Figure 3 is a block diagram showing, *inter alia*, an embodiment of the communication management unit; in this

embodiment, the communication management unit comprises a dispatching unit, a plurality of queues and a queue control unit;

Figure 4 is a flowchart which shows a method where a communication application communicates according to an embodiment; a check to find out if a communication link is available is performed;

Figure 5 is a flowchart which shows a method where a message is provided to the transport/network layer for transmission in the case where a communication link is available;

Figure 6 is a flowchart which shows a method where a message is provided to a queue in an embodiment; according to a first step, a suitable queue is selected and according to a second step, the message is provided to a selected suitable queue; and

Figure 7 is a flowchart which shows a method which takes into account what happens when a check is performed to find out if a communication link is available.

DETAILED DESCRIPTION

According to a first aspect, there is provided a method for handling communications over a non-permanent communication link. The method comprises centrally receiving a message to transmit from at least one application among a plurality of applications, checking the availability of the non-permanent communication link, if the non-permanent communication link is not-available, queuing the received message for future transmission, and providing the message to a transport/network layer if the communication link is available.

According to another aspect, there is provided a communication management unit for handling communications from a plurality of applications to a transport/network layer and over a non-permanent communication link. The
5 communication management unit comprising: a dispatching unit receiving a message to transmit at least one application among the plurality of applications; a queuing control unit for checking the availability of the non-permanent communication link; and a queue for queuing
10 the received message if the non-permanent communication link is not-available, and for providing the message to a transport/network layer if the communication link is available.

In the following description of the embodiments,
15 reference to the accompanying drawings is by way of illustration of examples. It will be understood that other embodiments may be made without departing from the scope of the application disclosed.

Now referring to Fig. 1, there is shown an embodiment of
20 a system wherein the method for handling communications over a non-permanent communication link disclosed below may be advantageously used.

The system comprises a server unit 10, a network 12, a plurality of transmitting devices 16 and a plurality of
25 user devices 18.

The server unit 10 is adapted for providing a signal to send to the plurality of user devices 18 over a communication link. In the present embodiment, the communication link is an air interface and is not shown.
30 The server unit 10 may comprise any type of processing

unit that is connected permanently or temporarily with the plurality of user devices 18.

The network 12 comprises at least one of a Local Area Network (LAN), a Metropolitan Area Network (MAN) and a
5 Wide Area Network (WAN). In an embodiment, the network 12 comprises a Wide Area Network which is the Internet.

The plurality of transmitting devices 16 comprises wireless transmitters adapted to transmit data to the plurality of user devices 18.

10 The plurality of user devices 18 comprises devices that are adapted to process at least data. In one embodiment, shown in Fig. 1, the plurality of user devices 18 are wireless user devices. It should be appreciated that various types of devices may be used such as Personal
15 Digital Assistants (PDAs), smart phones, etc. In an embodiment, the plurality of user devices 18 comprises BlackBerry™ devices which are manufactured by Research In Motion Limited.

More precisely, the server unit 10 is adapted to provide
20 to the network 12, inter alia, a signal to send.

At least one of the plurality of transmitting devices 16 is adapted to transmit a signal to at least one of the plurality of user devices 18.

Now referring to Fig. 2, there is shown how a plurality
25 of applications 20 communicates with a transport/network layer 24. It should be appreciated that in the embodiment disclosed herein, the plurality of applications 20 is located on at least one of the plurality of user devices 18 (from Fig. 1). Alternatively, the plurality of

applications may be located on the server unit 10 (from Fig. 1).

A communication management unit 22 is provided and is adapted for receiving at least one message to transmit
5 which is provided by the plurality of applications 20. The communication management unit 22 is further adapted for providing the provided messages to transmit to the transport/network layer 24.

In an embodiment herein, the communication management
10 unit 22 is implemented as a system-level container. It will be further appreciated that the communication management unit 22 is adapted for listening for events related to the network coverage status of the user device 18. These events are generated by a lower-level transport
15 layer, also referred to as transport/network layer 24. The transport/network layer 24 may use a polling solution where it periodically attempts to open a successful connection to the network to detect the status of the wireless device 18. However, the transport layer designer
20 may use some other solutions to consistently update the status of the wireless device 18. When the communication management unit 22 receives an event from the transport layer indicating that the device is out of coverage, it starts queuing messages provided by anyone of the
25 plurality of applications 20 and does not attempt to transmit any through the transport/network layer 24. It will be appreciated and further shown below that a queue may be chosen according to various criteria. In fact there may be a queue per destination server (i.e. the
30 criterion is the destination server of a message), as in an embodiment, a queue per application (i.e. the criteria is a number of application), a single queue, or the like,

depending on requirements. When the communication management unit 22 receives an event from the transport layer indicating that the device is in coverage, it resumes transmission of messages through the transport/network layer 24. It will be appreciated that in one embodiment, the communication management unit 22 is also aware of the different servers that the plurality of applications might communicate with. Such information may be obtained at the application installation time, or, as in an embodiment, when a handshake between the system containing the communication unit and each server initially takes place. After such handshake, the application communicating with that server may be installed. It will be appreciated that each server has to be notified that the wireless device 18 is back in coverage and any messages queued on the server should then be sent to the applications, which can be done by sending any type of messages to the server. So if there is at least one application message to send to the server, the application message is sent. Alternatively, a special "Heartbeat" message may be sent. When the server successfully receives a message from the wireless device 18 that was previously unreachable, the server resumes transmission of messages to this device.

In the embodiment disclosed, the plurality of applications 20 comprises a first communication application 26, a second communication application 28 and a third communication application 30.

Still in the embodiment disclosed in Fig. 2, the first communication application 26 provides a first message to transmit to the communication management unit 22, while the second communication application 28 provides a second

message to transmit to the communication management unit 22, and the third communication application 30 provides a third message to transmit to the communication management unit 22.

5 The communication management unit 22 receives a status signal provided by the transport/network layer 24. The status signal is indicative of the availability of the communication link which is intended to be used for transmitting the messages. The communication management
10 unit 22 provides at least one message to send to the transport/network layer 24 of the user device 18.

The transport/network layer 24 transmits the message to send over the communication link (not shown here).

Now referring to Fig. 3, there is shown an example of the
15 communication management unit 22.

In the embodiment disclosed in Fig. 3, the communication management unit 22 comprises a dispatching unit 36, a plurality of queues 32, and a queuing control unit 44.

The dispatching unit 36 receives the plurality of
20 messages to transmit provided by the plurality of applications 20.

The dispatching unit 36 is adapted for sorting the plurality of messages according to at least one criterion. In one embodiment, the criterion is the
25 destination server for the message. In fact, the skilled addressee will appreciate that a first given message may be intended to be delivered to a first server while a second given message may be intended to be delivered to a second given server.

Each of the plurality of queues 32 is used for storing at least one of the plurality of messages to transmit provided by the plurality of applications 20 to the communication management unit 22.

- 5 In one embodiment, the number of queues of the plurality of queues 32 depends on the at least one criterion disclosed above.

The communication management unit 22 further comprises a queuing control unit 44. The queuing control unit 44 is
10 adapted for controlling the plurality of queues 32. In the embodiment disclosed, the queuing control unit 44 receives a status signal provided by the transport/network layer 24 and provides a plurality of corresponding enable signals to each queue of the
15 plurality of queues 32. The enable signal provided to a given queue is indicative of an available communication link and is therefore used to empty the given queue. It will be appreciated that the enable signal may be provided to each of the plurality of queues 32 according
20 to various strategies depending on the type of queues.

Each of the queues of the plurality of queues 32 provides corresponding queued messages to send to the transport/network layer 24.

In the embodiment disclosed in Fig. 3, the plurality of
25 queues 32 comprises a first queue 38, a second queue 40 and a third queue 42. It will be appreciated by the skilled addressee that in an embodiment no maximum size is set for a given queue. However, a limit is preferably set using a number of pending messages to send from any
30 one of the plurality of applications 20. Still in an embodiment, the limit is the lower of a maximum number of

outbound pending messages for a given application stated by either the system within which the given application is running or the given application itself at the installation time. The limit is imposed by the communication management unit 22. Once the limit is reached, the given application is notified. It is up to the given application to prevent the user from sending any further messages. The communication management unit 22 rejects then all message from the given application after the limit is reached. The application has then to perform the necessary handling of the rejected messages.

The queuing control unit 44 disclosed in Fig. 3 may provide a first enable signal to the first queue 38, a second enable signal to the second queue 40 and a third enable signal to the third queue 42 when the communication link is available.

In response to the first enable signal, the first queue 38 may provide corresponding queued messages to send to the transport/network layer 24, while in response to the second enable signal, the second queue 40 may provide corresponding queued messages to send to the transport/network layer 24 and in response to the third enable signal, the third queue 42 may provide corresponding queued messages to send to the transport/network layer 24.

Now referring to Fig. 4, there is shown an embodiment which shows how a communication application communicates according to an embodiment.

According to step 50, a request for transmitting a message is received from a communication application. The

request is received by the communication management unit 22.

In one embodiment, the message is directly provided to the communication management unit 22.

5 According to step 52, a check is performed in order to find out if the communication link is available. In an embodiment, the check is performed by checking the status of a state variable belonging to the queue for the outgoing message. The state variable is set to one of
10 "Enabled" (i.e. the communication link is available) or "Disabled" (i.e. the communication link is not available). The skilled addressee should appreciate that the state variable is set to one of "Enabled" and "Disabled" depending on the received event provided by
15 the transport/network layer 24. It should be appreciated that preferably the state variable is maintained independently for each queue as there may be additional reasons to not send any messages to a server even when the device is in coverage, such as the remote server
20 being down for instance. The state of the queue is checked to see if new messages should be sent or kept queued.

In the case where the communication link is not available and according to step 58, the message to transmit is
25 provided to a queue. In an embodiment, the message is provided to a queue of the plurality of queues 32.

In the case where the communication link is available and according to step 54, the message is provided to the transport/network layer 24 (see Fig. 2) for transmission.

According to step 56, the message is transmitted by the transport/network layer 24.

Referring to Fig. 5, there is shown how the message to transmit is provided to the transport/network layer 24 (see Fig. 2) for transmission according to one embodiment.

According to step 60, the message to transmit is provided to a corresponding queue. As explained above, the message to transmit is provided to a corresponding queue depending on various criteria. In this embodiment, the message to transmit is provided to a corresponding queue using the dispatching unit 36 (see Fig. 3).

According to step 62, the corresponding queue is emptied to provide the queued message to the transport/network layer 24. Still in this embodiment, the corresponding queue is emptied using an enable signal provided by the queuing control unit 44 (see Fig. 3).

Now referring to Fig. 6, there is shown how the message to transmit is provided to a queue in the case where the communication link is not available.

According to step 70, a suitable queue is selected for the message to transmit. The suitable queue is selected amongst the plurality of queues 32 using the dispatching unit 36 (see Fig. 3) depending on at least one criterion as explained above.

According to step 72, the message to transmit is provided to the selected suitable queue.

Now referring to Fig. 7, there is shown what happens in the case where a communication link becomes available.

According to step 80, a status check is performed at the transport/network layer 24 (see Fig. 2).

According to step 82, a check is performed in order to find out if the communication link is now available.

- 5 In the case where the communication link is available and according to step 84, an enable signal is provided to the plurality of queues 32.

According to step 86, an indication is provided to a remote unit. In fact, the indication is used to inform
10 the remote unit to which user device 18 it is connected with via the communication link so that user device 18 may be reregistered on the remote unit.

According to step 88, the plurality of queues 32 are emptied.

- 15 The skilled addressee will appreciate that without the communication management unit 22, each of the plurality of applications 20 would have to individually listens for and handle the coverage events. Moreover, the skilled addressee will further appreciate that other various
20 types of events have to be handled. For instance, "Radio On/Off" events are produced when a user turns the radio/wireless coverage off or on. The skilled addressee will appreciate that the communication management unit 22 is capable of handling all events related to network
25 coverage and translating them into whether or not it is possible to send a message.

It should be noted that the present invention can be carried out as a method, can be embodied in a system, a computer readable medium (or memory) or an electrical or
30 electro-magnetical signal.

Although the above description relates to a specific embodiment as presently contemplated by the inventor, it will be understood that the application in its broad aspect includes mechanical and functional equivalents of
5 the elements described herein.

WE CLAIM:

1. A method for handling communications over a non-permanent communication link, said method comprising:
 - centrally receiving a message to transmit from at least one application among a plurality of applications;
 - checking the availability of said non-permanent communication link;
 - if said non-permanent communication link is not-available, queuing said received message for future transmission; and
 - providing said message to a transport/network layer if said communication link is available.
2. The method as claimed in claim 1, wherein said queuing of said received message for future transmission comprises selecting an appropriate queue amongst a plurality of queues for said received message and providing said received message from said selected appropriate queue.
3. The method as claimed in claim 2, wherein said plurality of queues comprises one of a queue per application and a queue per destination server.
4. The method as claimed in claim 1, wherein said checking comprises receiving a status signal from said transport/network layer.
5. The method as claimed in claim 4, wherein said receiving of said status signal is performed in response to at least one event provided by said transport/network layer.

6. The method as claimed in claim 4, wherein said receiving of said status signal is provided in response to a request for a status check.
7. The method as claimed in claim 1, wherein said queuing is performed in a given queue having a given limit.
8. The method as claimed in claim 7, wherein said given limit is created using at least one of a maximum number of messages to send for a given application.
9. The method as claimed in claim 7, wherein when said given queue reaches said given limit, a notification is provided to a given application.
10. The method as claimed in claim 9, wherein said application notifies a user upon receipt of said notification.
11. A computer readable memory comprising instructions which when executed perform the steps of:
 - centrally receiving a message to transmit from at least one application among a plurality of applications;
 - checking the availability of said non-permanent communication link;
 - if said non-permanent communication link is not-available, queuing said received message for future transmission; and
 - providing said message to a transport/network layer if said communication link is available.
12. The computer readable memory as claimed in claim 11, wherein said queuing of said received message for future transmission comprises selecting an

appropriate queue amongst a plurality of queues for said received message and providing said received message from said selected appropriate queue.

13. The computer readable memory as claimed in claim 12, wherein said plurality of queues comprises one of a queue per application and a queue per destination server.
14. The computer readable memory as claimed in claim 11, wherein said checking comprises receiving a status signal from said transport/network layer.
15. The computer readable memory as claimed in claim 14, wherein said receiving of said status signal is performed in response to at least one event provided by said transport/network layer.
16. The computer readable memory as claimed in claim 14, wherein said receiving of said status signal is provided in response to a request for a status check.
17. The computer readable memory as claimed in claim 11, wherein said queuing is performed in a given queue having a given limit.
18. The computer readable memory as claimed in claim 17, wherein said given limit is created using at least one of a maximum number of messages to send for a given application.
19. The computer readable memory as claimed in claim 17, wherein when said given queue reaches said given limit, a notification is provided to a given application.

20. The computer readable memory as claimed in claim 19, wherein said application notifies a user upon receipt of said notification.

21. A communication management unit for handling communications from a plurality of applications to a transport/network layer and over a non-permanent communication link, said communication management unit comprising:

a dispatching unit for receiving a message to transmit at least one application among said plurality of applications;

a queuing control unit for checking the availability of said non-permanent communication link; and

a queue for queuing said received message if said non-permanent communication link is not-available, and for providing said message to a transport/network layer if said communication link is available.

22. The communication management unit as claimed in claim 21, wherein said queue comprises a plurality of queues, wherein said queuing control unit is further for selecting an appropriate queue amongst said plurality of queues for said received message and for providing said received message from said selected appropriate queue.

23. The communication management unit as claimed in claim 22, wherein said plurality of queues comprises one of a queue per application and a queue per destination server.

24. The communication management unit as claimed in claim 21, wherein said queuing control unit is further for receiving a status signal indicative of the availability of said non-permanent communication link and for producing an enable signal when said non-permanent communication link is available; and further wherein said queue is further for queuing said received message in absence of said enable signal and for forwarding said received message in presence of said enable signal.
25. The communication management unit as claimed in claim 24, wherein said queuing control unit receives said status signal in response to at least one event provided by said transport/network layer.
26. The communication management unit as claimed in claim 24, said queuing control unit receives said status signal in response to a request for a status check.
27. The communication management unit as claimed in claim 21, wherein said queue comprises a plurality of queues, wherein said queuing control unit is further for selecting an appropriate queue amongst said plurality of queues for said received message and for providing said received message from said selected appropriate queue, and further wherein a given queue of said plurality of queues has a given limit.
28. The communication management unit as claimed in claim 27, wherein said given limit is created using at least one of a maximum number of messages to send for a given application.

29. The communication management unit as claimed in claim 27, wherein given queue reaches said given limit, further wherein when said given queue reaches said given limit, a notification is provided to a given application.
30. The communication management unit as claimed in claim 29, wherein said application notifies a user upon receipt of said notification.