Amendments to the Specification:

Please replace paragraph [0029] with the following amended paragraph:

[0029] In the method and apparatus an MLME-SCAN.request primitive with a ScanType indicating an active scan may be received and on a condition that a ProbeDelay timer is expired or that a PHYRxStart.indication primitive is received, a basic access procedure may be performed. In the method and apparatus, transmission of a Probe Request may be suspended or cancelled. The suspension of cancellation may be performed via primitives between a station management entity (SME) and ~~amedia~~ a media access control (MAC) layer management entity (MLME), whereby an MLME-Scan-STOP.request primitive may indicate the suspension of active scanning for a current channel. Further in the method and apparatus, a probe request frame may be transmitted on the condition that a probe response frame is not decoded.

Please replace paragraph [0063] with the following amended paragraph:

[0063] A FILS process may comprise five phases: AP discovery, network discovery, additional timing synchronization function ~~(TSF),authentication~~ (TSF), authentication and association, and higher layer IP setup.

Please replace paragraph [0064] with the following amended paragraph:

[0064] FIG. 2 shows an example of an IEEE 802.11 link setup. In FIG. 2, Extensible Authentication Protocol (EAP) is used. Shown in FIG. 2 are the five ~~phases of~~ phases: AP discovery 202 which may be achieved using either active scanning or passive scanning by the STAs, network discovery 204, additional TSF 206, authentication 208 and associations 210, and higher layer IP setup 212.

Please replace paragraph [0066] with the following amended paragraph:

[0066] There may be two types of scanning: active scanning and passive scanning. Active scanning and FILS are described herein. Passive scanning may be characterized as follows:

Please replace paragraph [0078] with the following amended paragraph:

[0078] FIG. 3 shows an example of active scanning. A filter list may be added to Probe Request frames 304 to enable a requesting STA to define the APs that may respond more precisely. A transmitter 302 of the Probe Request frame 304 may indicate a Max Channel Time for which it may be available to receive Probe Response frames ~~306.The~~ 306. The transmitter 302 of the Probe Request frame 304 may cancel the transmission of a pending Probe Response frames 306 by sending a Probe End frame to the AP(s), thus avoiding unnecessary retransmissions of probe responses if the transmitter of the Probe Request frame switches to scan another channel.

Please replace paragraph [0108] with the following amended paragraph:

[0108] In a first scenario, when a large number of STAs that are seeking initial link setup enter a BSS simultaneously, the STAs conducting active scanning may send Probe Request frames to the AP. For example, based on real traffic measurements in a Tokyo train station, the number of Probe Response packets is about four to five times more than the number of Probe Request packets, which indicates that each Probe Request packet triggers 4 to 5 Probe Response packets on average. This is a result of using Probe Request frames with Wildcard SSID. Further, air time occupancy by Probe Request/Response packets takes about 18.32%. In addition, the number of Probe Request/Response packets is about 35% of the total packets, which increases the probability of channel access collision and delay, hence resulting in latency for active scanning of AP. It is therefore desirable to avoid unnecessary transmissions of Probe Request frames sent by the STAs

seeking initial link setup. In ~~addition minimizing~~ addition, minimizing the transmissions of a Probe Request with Wildcard SSID is also desired.

Please replace paragraph [0110] with the following amended paragraph:

[0110] FIG. 4 shows ~~as example of Probe Response cancellation~~ an example of station and access point ranges. For example, consider a scenario where STA1 402 is able to hear AP1/BSS1 404 and AP2/BSS2 406, but STA2 ~~408is~~ 408 is not able to hear AP1/BSS1 404 but can hear AP2/BSS2 406. Further, STA1 402 sends a Probe Request that is received by AP1 404 and ~~AP2406~~ AP2 406 and receives a response to the Probe Request from AP1 404 successfully including information of AP2/BSS2 406. AP2 406 overhears the response to probe request with its BSS sent by AP1 404 may not transmit a Probe Response frame to respond to Probe Request from STA1 402. However, STA2 408 does not receive the response since it is far away from AP1 ~~404.After~~ 404. After that, STA2 408 sends a Probe request to AP2 406. Then, both AP1 404 and AP2 406 receive a Probe End frame from STA1 402 before AP2 ~~408~~ 406 starts the transmission of response to the second Probe Request.

Please replace paragraph [0111] with the following amended paragraph:

[0111] FIG. 5 shows an example of Probe Response cancellation. STA1 502 sends a Probe Request 504 to AP1 500 and successfully receives the response 505 to the Probe Request 504 from AP1 500. STA2 506 sends a Probe request 508 to AP1 500. AP1 500 receives a Probe End 510 frame from STA1 502, and ~~causes~~ cancels the response at 512, before it starts the transmission of response to the second Probe Request 508.

Please replace paragraph [0131] with the following amended paragraph:

[0131] An active scanning procedure, upon receipt of an MLME-SCAN.request primitive with ScanType indicating an active scan, a STA2 ~~606may~~ 606 may perform the following:

Please replace paragraph [0133] with the following amended paragraph:

[0133] a) Wait until a ProbeDelay time has expired or a PHYRxStart.indication primitive has been received. Additionally, the STA2 606 may cancel an attempt of transmitting its Probe Request 608 for a second STA2 before the Probe delay timer 610 expires or a PHYRxStart.indication primitive has been received if the following conditions are met: The STA2 606 overhears a Probe Request frame 604 ~~frame~~ from STA1 602; The RSSI of the received Probe Request frame 604 ~~frame~~ is no less than a pre-defined threshold; and [[The]] [the] overheard Probe request frame 604 has a matched scanning target or parameter with the pending probe request.

Please replace paragraph [0134] with the following amended paragraph:

[0134] b) Perform a Basic Access procedure. Additionally, the STA2 606 may cancel an attempt of transmitting its Probe Request 608 for a second STA before it gains access to the medium only if the following conditions are met: The STA2 606 overhears a Probe Request frame 604 ~~frame~~; The RSSI of the received Probe Request frame 604 ~~frame~~ is no less than a pre-defined threshold; and The overheard Probe Request frame 604 has matched a scanning target with the pending probe request.

Please replace paragraph [0136] with the following amended paragraph:

[0136] In a first example, a new value "Stop current channel" may be added to the field of ScanStopType in the MLME-Scan-STOP.request 612 primitive. The MLME-Scan-STOP.request 612 primitive may be generated with the field of ScanStopType being set to "Stop current channel".

Please replace paragraph [0137] with the following amended paragraph:

[0137] In a second example, a new value "Stop" is added to the field of ScanStopType, and a new field of "ChannelIndex" is added in the MLME-Scan-STOP.request 612 primitive. The MLME-Scan-STOP.request ~~612may~~ 612 primitive

may be generated with the field of ScanStopType being set to "Stop", and the field of "ChannelIndex" being set to the index of the current channel.

Please replace paragraph [0138] with the following amended paragraph:

[0138] In a third example, a new field of "ChannelList" is added in the MLME-Scan-STOP.request 612 primitive. The MLME-Scan-STOP.request 612 primitive is generated with the field of ScanStopType being set to "Set_Criteria", and the field of "ChannelList" being set to the ChannelList in the corresponding MLME-Scan.request excluding the index of the current channel.

Please replace paragraph [0139] with the following amended paragraph:

[0139] If the probe request is cancelled for the current channel during the waiting time in steps a) or b) due to the receipt of overheard probe request with matched parameters/target, the STA may set a ProbeTimer to 0 and start the ProbeTimer. If PHY-CCA.indication (busy) primitive has not been detected before the ProbeTimer reaches MinChannelTime, then NAV may be set to 0 and the next ~~channelmay~~ channel may be scanned. Otherwise, the MLME may issue an MLME-SCAN.confirm 614 primitive with the BSSDescriptionSet containing information of the AP when Probe Response or Beacon frame is received from the AP for the first time. When ProbeTimer reaches MaxChannelTime, NAV may be set to 0 and the next channel may be scanned.

Please replace paragraph [0141] with the following amended paragraph:

[0141] In a second possible method regarding the first scenario, another active scanning procedure will now be described. Upon receipt of an MLME-SCAN.request primitive with ScanType indicating an active scan, a STA may, for each channel to be scanned, wait until a ProbeDelay time has expired or a PHYRxStart.indication primitive has been ~~received(also~~ received (also referred to herein as action a) and may perform a Basic Access procedure (also referred to herein as action b), for example, per IEEE 802.11 WLAN MAC or PHY procedures.

During Action a or Action b, the STA may further suspend or cancel an attempt of transmitting its Probe Request before the Probe delay timer expires or a PHYRxStart.indication primitive has been received if the following conditions are met: the STA overhears a Probe Request frame (also referred to herein as condition 1), the RSSI of a received Probe Request frame is no less than a threshold, for example, a predefined threshold (also referred to herein as condition 2), or an overheard Probe request has a matching scanning parameters/target with a pending probe request at the STA (also referred to herein as condition 3). The threshold may be set to a reasonably high value such that the conditional probability that the STA cannot decode the Probe Response frame responding to the overheard Probe Request, given that the overheard STA may decode such a Probe Response, is no more than a desired percentage (for example, 1%).

Please replace paragraph [0143] with the following amended paragraph:

[0143] Alternatively, the STA may determine whether the STA is in an area with a dense population of WiFi devices (for example, IEEE 802.11 devices). If during actions a or b, the average received signal/energy level (within the time PHY_CCA.indicate(BUSY)) is no less than a predetermined threshold, S1, then the STA may determine that the STA is in an area with a generated with the field of ScanStopType set to ~~"Set_Criteria"and~~ "Set_Criteria" and the field of "ChannelList" set to the ChannelList in the corresponding MLME-Scan.request excluding the index of the current channel.

Please replace paragraph [0157] with the following amended paragraph:

[0157] If a PHY-CCA.indication (busy) primitive has not been detected before the ProbeTimer reaches MinChannelTime, the STA may send its own Probe Request Frame if the average received signal/energy level during channel busy time before an attempt to transmit a Probe Request is suspended or cancelled or is no less than a predetermined threshold, S1. Otherwise, the ~~STA ,may~~ STA may set NAV to 0 and scan the next channel.

Please replace paragraph [0160] with the following amended paragraph:

[0160] In a third method regarding the first scenario, upon receipt of the MLME-SCAN.request primitive with a ScanType indicating an active scan, a STA may perform active scanning by generating Probe ~~request~~ Request frames and the subsequently processing received Probe Response frames.

Please replace paragraph [0165] with the following amended paragraph:

[0165] The cancellation ~~705~~ 708 can be done through primitives between the SME and MLME (or using other methods as noted). Upon receiving the required information of the channel to be scanned during the waiting time period, the SME may generate a MLME-Scan-STOP.request 712 primitive indicating stopping the scanning of the current channel. This can be achieved by one of the following described by way of example.

Please replace paragraph [0167] with the following amended paragraph:

[0167] In a second example, a new value "Stop" is added to the field of ScanStopType, and a new field of "ChannelIndex" is added in the MLME-Scan-STOP.request 712 primitive. The MLME-Scan-STOP.request 712 primitive is generated with the field of ScanStopType set to "Stop", and the field of "ChannelIndex" set to the index of the current channel.

Please replace paragraph [0168] with the following amended paragraph:

[0168] In a third example, a new field of "ChannelList" is added in the MLME-Scan-STOP.request 712 primitive. The MLME-Scan-STOP.request 712 primitive is generated with the field of ScanStopType being set to "Set_Criteria", and the field of "ChannelList" being set to the ChannelList in the corresponding MLME-Scan.request excluding the index of the current channel.

Please replace paragraph [0170] with the following amended paragraph:

[0170] If the STA2 706 has obtained required information of several channels to be scanned during the waiting time period through other sources during the waiting time period for a STA2 706 to actually transmit a Probe Request to the channel to be scanned, then the STA2 ~~706may~~ 706 may cancel the transmission of its pending Probe Request frames 708 on channels whose information is received. The cancellation is done through primitives between the SME and MLME. Upon receiving information of several channels to be scanned during the waiting time period, the SME may generate a MLME-Scan-STOP.request 712 primitive indicating a stop of scanning of the channels. This generation of an MLME-Scan-STOP.request 712 primitive indicating a stop of scanning of the channels may be achieved by any of the following. It may be generated by adding a new "Stop" value to the field of ScanStopType and a new field of "ChannelList" in the MLME-Scan-STOP.request ~~714~~ 712 primitive. The MLME-Scan-STOP.request ~~712may~~ 712 may be generated with the field of ScanStopType set to "Stop" and the field of "ChannelList" set to the indices of the channels whose information is received.

Please replace paragraph [0194] with the following amended paragraph:

[0194] When the AP sends the proxy Probe ~~Request. the~~ Request. The STA(s) may then hear the AP proxy Probe Request, and wait for the Probe Responses, then proceeding as if they had sent a Probe Request themselves.

Please replace paragraph [0196] with the following amended paragraph:

[0196] In a sixth method regarding the first scenario, when there is no AP operating on the channel to be scanned actively, but the adjacent channel may cause the scanning STA to scan the channel for the ~~MaxChannelTime.,~~ MaxChannelTime, the decision of the scanning STA whether or not to continue scanning of the channel beyond the initial scanning time may be based on whether PHY-RxStart.indication primitive instead of ~~PHY-CCA.indication(busy)~~ PHY-CCA.indication (busy) has been received by that time.

Please replace paragraph [0204] with the following amended paragraph:

[0204] With respect to the second scenario, efficient active scanning will now be described. An outstanding Probe ~~request~~ Request is a Probe ~~request~~ Request that an AP receives from a unique STA that has not been responded to yet, meanwhile the STA's associated MaxChannelTime for scanning specified in the Probe Request has not elapsed yet. In order to reduce premature cancellation of a response to a Probe Request frame, a STA may cancel a response to a Probe Request frame if for each outstanding Probe ~~request~~ Request the STA receives a valid Probe End frame from a corresponding STA that sent the Probe ~~request~~ Request.

Please replace paragraph [0220] with the following amended paragraph:

[0220] Access Category AC_FILS may be determined by the AP. In order to speed up the FILS process, the AC_FILS may have smaller Arbitration Inter Frame Space (AIFS) values, smaller Minimum Contention Windows (CWmin) and Maximum Contention Windows (CWmax) size compared to Access Category Voice (AC_VO). In addition, a transmission opportunity (TXOP) limit, which may be defined for AC_FILS, may be shorter or equal to the TXOP limit allowed for AC_VO.

Please replace paragraph [0221] with the following amended paragraph:

[0221] Further, because FILS frames are localized to the MAC layer in IEEE 802.11 communication, no new AC may ~~not~~ need to be assigned. FILS frames may be transmitted using localized FILS enhanced distributed channel access (EDCA) parameters similar to those described above both internal to the STA and on a wireless medium external to the STA. It is noted that an AC_FILS access category definition is exemplary herein and may be defined using different terminology.

Please replace paragraph [0249] with the following amended paragraph:

[0249] The description will now describe STA/AP behavior. An AP that is capable of expedited FILS may determine EDCA parameters such as AIFS, CWmin,

CWmax and TXOP Limit for AC_FILS depending on the FILS requirements, current network load, and the like, or an AP may determine the EDCA parameters for FILS frames without requiring that the FILS frames belong to a separate AC. An AP may change the AC_FILS or local FILS EDCA parameters from time to time and may include the AC_FILS or local FILS EDCA Parameter Set and/or Access Option IE in its beacons or short beacons or FILS Discovery frames or Probe Responses or other ~~type~~ types of management or control frames.

Please replace paragraph [0253] with the following amended paragraph:

[0253] The STAs and the AP may use the AC_FILS or local FILS EDCA parameters and the access policies set by the Access Option IE for the remainder of the FILS process. If there are multiple APs in the vicinity, a STA may adapt the AC_FILS or local FILS EDCA parameters and access policies that the STA desires to associate ~~with.The~~ with. The AP may use a different set of AC_FILS or local FILS EDCA parameters or access policies than advertised in its beacon for FILS related packet exchanges.

Please replace paragraph [0262] with the following amended paragraph:

[0262] AC indication subfield ~~1062~~ 1060: An AC Indication subfield ~~1062~~ 1060 may indicate the access category or categories of traffics that the STAs may transmit in the period(s) or beacon subinterval(s) indicated in the Schedule subfield. The AC Indication ~~1062~~ 1060 may be implemented as a bitmap.

Please replace paragraph [0263] with the following amended paragraph:

[0263] Schedule ~~1064~~ 1062: the Schedule Subfield ~~1064~~ 1062 may indicate the duration of the period(s) or beacon ~~subinterval(s). for~~ subinterval(s). For example, if duration T1 is specified in Field 1, duration T2 is specified in Field 2, and assuming that Period 1 starts at T0 (the starting point T0 may be referenced to a targeted beacon time, or to the end of current packet that contains the enhanced ILS ~~element.)~~ element), then Period 1 may last from T0 to T0+T1 and Period 2 may be

from T0+T1 to T0+T1+T2. Similarly Period N may be from T0+...+TN-1 to T0+...+TN-1+TN.

Please replace paragraph [0264] with the following amended paragraph:

[0264] Parameters ~~1066~~ 1064: the parameters for FILS packets and for non-FILS traffic packets. These parameters may include:

Please replace paragraph [0265] with the following amended paragraph:

[0265] EDCA parameters: EDCA parameters for each of the ILSCs that are allowed in the period(s) and beacon subinterval(s), and for each of ACs that are allowed to be transmitted in the period(s) and beacon subinterval(s); and

Please replace paragraph [0280] with the following amended paragraph:

[0280] With respect to the fourth scenario, differential probe request frame ~~format~~ formats are described ~~is~~ as shown in FIGS. 11 and 12. In some instances, some or most of the scanning parameters of a pending probe request of a STA are the same as those of an earlier received probe request, whereas some parameters are different. In order to allow for more frequent utilization of the simplified Probe Request frames 1100, 1200 (shown in FIGS. 11 and 12) to reduce overhead. A difference description field or IE ~~1100, 1120~~ 1110, 1210 may be used in the simplified Probe Request frame 1100, 1200 to indicate the difference between the parameters of the earlier overheard/received probe request and parameters that the STA seeks to send in a probe request.

Please replace paragraph [0282] with the following amended paragraph:

[0282] In a first difference description field for a request approach, the difference description field in a simplified Probe Request frame 1300, shown in FIG. 13 includes a fixed number of sub-fields 1310, 1320, 1330 or IEs describing the difference of a predefined element in the Probe Request. Each sub-field ~~1318~~ 1310,

1320, 1330 or IE may not include Element ID since the sequence and meaning of each field or IE is pre-determined.

Please replace paragraph [0293] with the following amended paragraph:

[0293] In a first response approach, shown in FIG. ~~17,the~~ 17, the difference description field in the simplified Probe Response frame 1700 includes a fixed number of sub-fields 1710, 1720, 1730 or IEs each describing the difference of a predefined element in the Probe Response 1700. Each sub-field or IE may not include an Element ID since the sequence and meaning of each sub-field or IE is pre-determined. One sub-field is the TSF value or timestamp value, which may be the difference or delta between the current TSF value and TSF value in an earlier Probe Response (that is, TSFcurrent – TSFearlier) or the current TSF.