CLAIMS

1. An apparatus for wireless communications, comprising: a processing system configured to generate one or more first frames that, collectively, include a set of parameters defining at least one broadcast target wake-up time (TWT) schedule and an assignment of one or more wireless nodes to one or more TWT groups to be serviced in different TWT service periods (SPs) associated with the at least one broadcast TWT schedule wherein the processing system is further configured to generate at least one second frame comprising an indication, for each of the TWT SPs, of one or more wireless nodes of a TWT group to be serviced; a first interface configured to output the one or more first frames for transmission, the first interface being further configured to output the at least one second frame for transmission; and a second interface configured to obtain at least a third frame from one of the one or more wireless nodes of the TWT group to be serviced, in response to the at least one second frame; and wherein the processing system is further configured to service wireless nodes from which third frames are received by the apparatus.

2. The apparatus of claim 1, wherein: the generation comprises assigning the one or more wireless nodes to a TWT group corresponding to the broadcast TWT schedule; and the one or more first frames include one or more identifications for the TWT group.

3. The apparatus of claim 1, wherein the generation comprises assigning the one or more wireless nodes to the one or more TWT groups, based on one or more preferred wake-up schedules of the one or more wireless nodes, wherein each wake-up schedule indicates availability of a corresponding one of the wireless nodes.

4. The apparatus of claim 3, wherein the processing system is further configured to learn the one or more preferred wake-up schedules of the one or more wireless nodes, based on detected presence of the one or more wireless nodes during previous TWT SPs.

5. The apparatus of claim 3, further comprising: at least a second interface configured to obtain at least a second frame indicating the preferred wake-up schedule of at least one of the one or more wireless nodes.

6. The apparatus of claim 3, further comprising: at least a second interface configured to obtain at least a second frame indicating a request from at least one of the one or more wireless nodes to change at least one of the assignment or a preferred wake-up time, wherein the processing system is configured to assign or re-assign at least one of the one or more wireless nodes to a TWT group based on the request.

7. The apparatus of claim 1, further comprising: at least a second interface configured to obtain at least a second frame comprising an indication of whether or not a wireless node prefers selecting its own TWT group; and wherein the processing system is configured to assign that wireless node to a TWT group based, at least in part, on the indication of whether or not that wireless node prefers selecting its own TWT group.

8. The apparatus of claim 1, wherein the at least one second frame comprises at least one of: a traffic indication map (TIM) indicating one or more wireless nodes of the TWT group to be serviced or one or more wireless nodes not to be serviced, or a discovery frame to be output for transmission between beacon frames, wherein the discovery frame includes at least one of: a presence of an element including the indication of the one or more wireless nodes of the TWT group to be serviced; an update to the at least one broadcast TWT schedule; or at least one of a broadcast TWT identification or group broadcast TWT identification that indicates the one or more wireless nodes of the TWT group to be serviced.

9. The apparatus of claim 1, wherein: the at least one second frame comprises a trigger frame of a first format to be output for transmission at a beginning of the broadcast TWT service period; and the indication of which nodes of the TWT group are to be serviced comprises one or more association identification (AIDs) included in place of one or more padding fields used in trigger frames of a second format.

10. An apparatus for wireless communications, comprising: a processing system configured to generate one or more first frames that, collectively, include a set of parameters defining at least one broadcast target wake-up time (TWT) schedule and an assignment of one or more wireless nodes to one or more TWT groups to be serviced in different TWT service periods (SPs) associated with the at least one broadcast TWT schedule, wherein the processing system is further configured to generate at least one second frame comprising an indication, for each of the TWT SPs, of one or more wireless nodes of a TWT group to be serviced; and a first interface configured to output the one or more first frames for transmission, the first interface being further configured to output the at least one second frame for transmission; and wherein the processing system is further configured to decide to provide the indication of which one or more wireless nodes of the TWT group are to be serviced in a discovery frame based, at least in part, on alignment of discovery frames with broadcast TWT service periods.

11. An apparatus for wireless communications, comprising: a first interface configured to obtain one or more first frames from a wireless node that, collectively, include a set of parameters defining at least one broadcast target wake-up time (TWT) schedule and an assignment of the apparatus to at least one TWT group to be serviced in TWT service periods (SPs) associated with the at least one broadcast TWT schedule; and a processing system configured to cause the apparatus to exit a first state before or during a TWT SP, based on the broadcast TWT schedule and the assignment, wherein: the first interface is further configured to obtain, after exiting the first state, at least a second frame comprising an indication of whether or not the apparatus is to be serviced; each of the at least second frame is a discovery frame when aligned with one of the TWT SPs; and the processing system is further configured to re-enter the first state if the second frame indicates the apparatus is not to be serviced.

12. The apparatus of claim 11, wherein: the first state comprises a reduced power state with one or more components of the apparatus powered down.

13. The apparatus of claim 11, wherein: the processing system is further configured to generate at least a second frame indicating a preferred wake-up schedule of the apparatus for use by the wireless node in determining the at least one TWT group; the apparatus further comprises at least a second interface configured to output the second frame for transmission to the wireless node;

and the processing system is further configured to generate the second frame after obtaining the one or more first frames or during an association procedure performed with the wireless node.

14. The apparatus of claim 13, wherein: the processing system is further configured to generate at least a third frame indicating a change in a preferred wake-up time.

15. The apparatus of claim 11, wherein: the processing system is further configured to generate at least a second frame requesting the wireless node to change the assignment of the apparatus or indicating whether or not the apparatus prefers selecting its own TWT group; and the apparatus further comprises at least a second interface configured to output the second frame for transmission to the wireless node.

16. The apparatus of claim 11, wherein: the first interface is further configured to obtain one or more frames that re-assign the apparatus to a different TWT group; and the processing system is further configured to cause the apparatus to exit the first state before or during a TWT SP corresponding to the different TWT group.

17. The apparatus of claim 11, wherein the discovery frame is obtained between beacon frames, and wherein the discovery frame includes at least one of a broadcast TWT identification or group broadcast TWT identification that indicates which members of the at least one TWT group are to be serviced.

18. The apparatus of claim 11, wherein the first interface comprises a receiver configured to receive the one or more first frames and the apparatus is configured as a wireless station.

19. A wireless station, comprising: a processing system configured to generate one or more first frames that, collectively, include a set of parameters defining at least one broadcast target wake-up time (TWT) schedule and an assignment of one or more wireless nodes to one or more TWT groups to be serviced in different TWT service periods (SPs) associated with the at least one broadcast TWT schedule wherein the processing system is further configured to generate at least one second frame comprising an indication, for each of the TWT SPs, of one or more wireless nodes of a TWT group to be serviced; and a transmitter configured to transmit the one or more first frames, the transmitter being further configured to output the at least one second frame for transmission; and a receiver configured to receive at least a third frame from one of the one or more wireless nodes of the TWT group to be serviced, in response to the at least one second frame; and wherein the processing system is further configured to service wireless nodes from which third frames are received by the wireless station.