more parameters, such as whether the processor has knowledge of the number and/or location of mobile stations **15** using the frequency corresponding with that processing module **62**.

[**0065**] One or more processing modules **62** may also be operable to synchronize smart antenna apparatus **16** with base station transceiver **24** in time and/or frequency. In particular, one or more processing modules **62** may be operable to execute one or more synchronization algorithms using control signals, including synchronization signals, received from control channel monitoring module **104** to synchronize smart antenna apparatus **16** with base station transceiver **24**.

[**0066**] Processing system **102** may also include a central processing unit, such as host processor **118**, operable to further process the output of each processing module **62**. In one embodiment, host processor **118** is operable to determine errors or whether the outputs of one or more processing module **62** are valid or require modification.

[**0067**] Each processing module **62** may include one or more processors **63**, such as microprocessors, digital signal processors, or any other type of processors capable of executing an algorithm. In one embodiment, each processing module **62** includes one or more programmable digital signal processors. Although processing system **102** as described above includes discrete processing modules **62** for processing signals at different frequencies or for performing different functions, it should be understood that the processing functions performed by smart antenna system **14** may be performed by any appropriate number and combination of processing modules **62**.

[**0068**] Referring again to FIG. **2**, storage system **103** is operable to store information or data for use by smart antenna apparatus **16**. In particular, storage system **103** may store information received from signaling information monitoring system **106**. Storage system **103** may also be operable to provide information to and receive information from processing system **102**.

[**0069**] Control channel monitoring module **104** is generally operable to receive control channel signals, including synchronization signals, being communicated from base station transceiver **24** to antenna unit **18**, and to prepare such signals to be processed by processing system **102**. In some embodiments, control channel monitoring module **104** is operable to filter and convert the control channel signals from a base station transmitting frequency to a smart antenna receiving frequency, receive and sample the signals, and communicate the signals to processing system **102**. The control channel signals, including the synchronization signals, may then be processed by processing system **102** in order to synchronize smart antenna apparatus **16** with base station transceiver **24**, as discussed in greater detail below with reference to FIGS. **5** through **8**.

[**0070**] Signaling information monitoring system **106** is generally operable to monitor, or receive, signaling information (in other words, base station control information) being communicated between base station transceiver **24** and base station controller **26** via interface **36**. Signaling information monitoring system **106** may also be operable to extract a subset of relevant information from the received signaling information to communicate to processing system **102** as an input in making beam-selection determinations. The relevant information may include information related to one or more mobile stations **15**, such as frequency hopping, for example. The systems and methods for monitoring the signaling information are discussed in greater detail below with reference to FIGS. **9** and **10**.

[**0071**] The various systems and modules of smart antenna apparatus **16**, including receiving system **100**, processing system **102**, control channel monitoring module **104**, and signaling information monitoring system **106**, as well as the components of each system and module, may or may not be co-located, and may be divided and/or combined in any appropriate manner. For example, smart antenna apparatus **16** may include a ground unit located on or near the ground and a tower unit coupled to antenna tower **22**. In one embodiment, smart antenna apparatus **16** includes a ground unit located on the ground and a tower unit located near the top of antenna tower **22** proximate antenna unit **18**. In another embodiment, smart antenna apparatus **16** includes a ground unit and a tower unit both located on or near the ground. In another embodiment, smart antenna apparatus **16** includes only one unit such that the components of smart antenna apparatus **16** are generally co-located.

[**0072**] As shown in FIG. **2**, antenna unit **18** may include antenna array **28** comprising antenna elements **30**, as well as a beam forming network (BFN) **128**. Beam forming network **128** is operable to form a plurality of uplink beams **130**, each corresponding with, and communicating signals received via, one of the narrow beams **34** by controlling the amplitude and phase of signals received by antenna elements **30**. In one embodiment, beam forming network **128** forms seven uplink beams **130**.

[**0073**] In operation, uplink analog signals are communicated by one or more mobile stations **16** via one or more narrow beams **34** and received by antenna array **28**. Beam forming network **128** forms a plurality of uplink beams **130** and communicates uplink beams **130** to smart antenna apparatus **16**. Uplink beams **130** are received by receiving system **100**. In one embodiment in which smart antenna apparatus **16** includes diplexer **122**, uplink beams **130** are received by receiver system **100** after passing through diplexer **122**. Each uplink beam **130** may be received by a separate frequency receiver unit **108**. Each beam may then be converted from analog to digital by a sampler **116**.

[**0074**] The digital uplink beams **130** are then communicated to processing system **102**. Using the received uplink beams **130**, signaling information received from signaling information monitoring system **106**, and/or other parameters as input, processing system **102** executes one or more beam-selection algorithms to determine a receiving beam selection **126** corresponding to one of the uplink beams **130**. The receiving beam selection **126** is communicated to a receiving beam switch **127** which filters the uplink beams **130** received from beam forming network **128** such that only the uplink beam **130** corresponding to the receiving beam selection **126** may pass through to base station transceiver **24**. In one embodiment in which smart antenna apparatus **16** includes diplexer **120**, the uplink beam **130** is received by base station transceiver **24** after passing through diplexer **120**.

[**0075**] In particular, each processing module **62** may execute one or more beam-selection algorithms to determine