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(54) **ANTENNA DEVICE AND METHOD IN A MIMO SYSTEM**

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CPC *H04B 7/0456* (2013.01); *H04B 7/0469* (2013.01); *H04B 7/0434* (2013.01); *H04B 7/0617* (2013.01)
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(58) **Field of Classification Search**
CPC ... H04B 7/0434; H04B 7/0617; H04B 7/0456
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See application file for complete search history.

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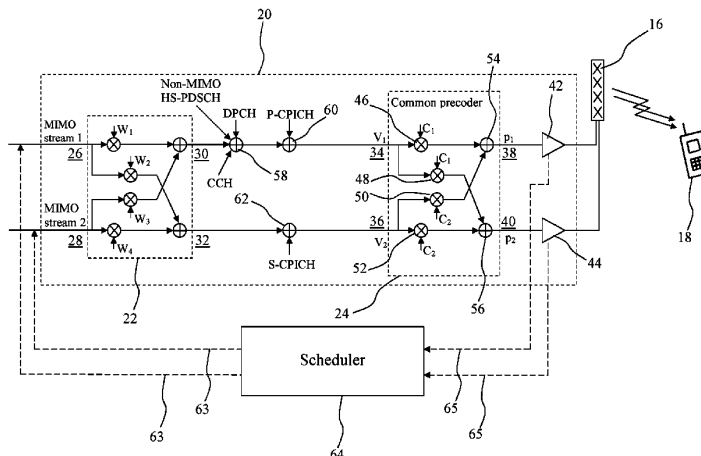(74) *Attorney, Agent, or Firm* — Vincent J. Allen; James H. Ortega; Carstens & Cahoon, LLP

(57) **ABSTRACT**

The invention relates to the technical field of radio communications, and in particular to an antenna device for a radio base station, and a method of operating an antenna device in a Multiple-Input Multiple-Output system. Embodiments of the invention disclose a secondary precoder (**24**) in series with a Multiple-Input Multiple-Output precoder (**22**). The Multiple-Input Multiple-Output precoder (**22**) has a first plurality of inputs (**26**, **28**) for one or more Multiple-Input Multiple-Output data streams, and a first plurality of outputs (**30**, **32**) for the one or more Multiple-Input Multiple-Output data streams. The secondary precoder has a second plurality of inputs (**34**, **36**) and a second plurality of outputs (**38**, **40**). The first plurality of outputs (**30**, **32**) are in communication with the second plurality of inputs (**34**, **36**). The antenna device further comprises a controller device (**64**), and the antenna device is operable to control an output power value of the one or more data streams at the second plurality of outputs (**38**, **40**).

19 Claims, 6 Drawing Sheets

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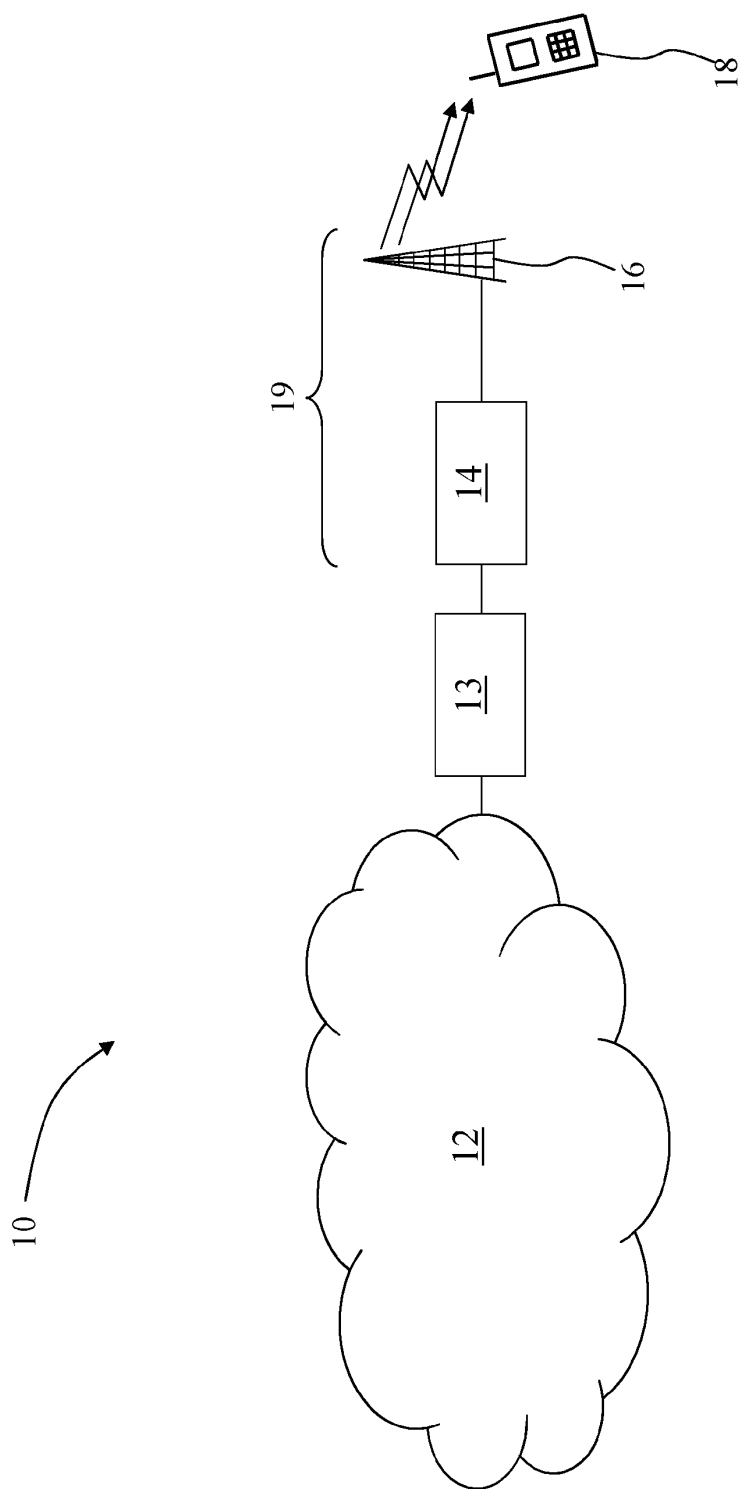Supplementary European Search Report, Application No. EP10857591.1 dated Feb. 27, 2014.
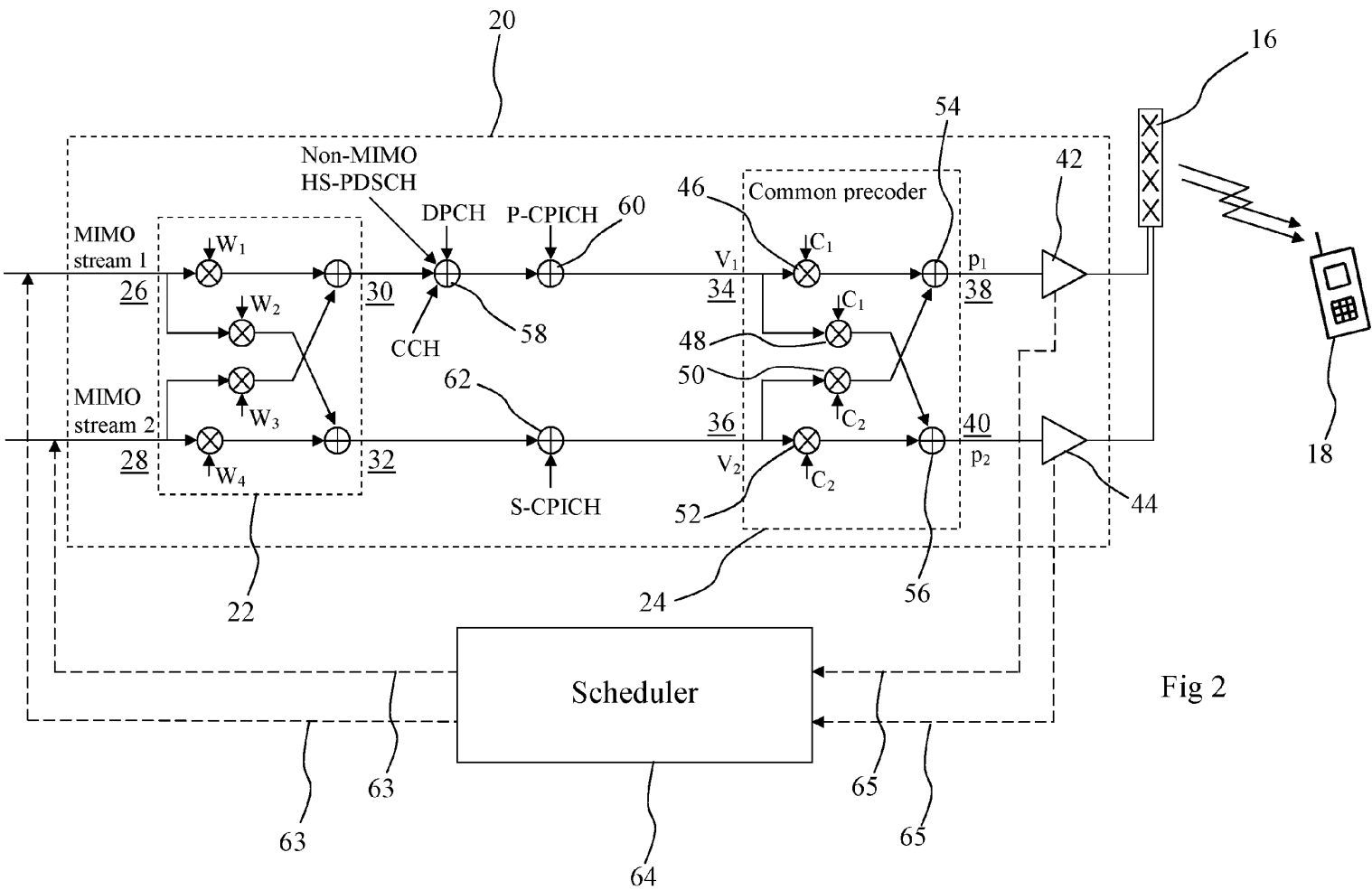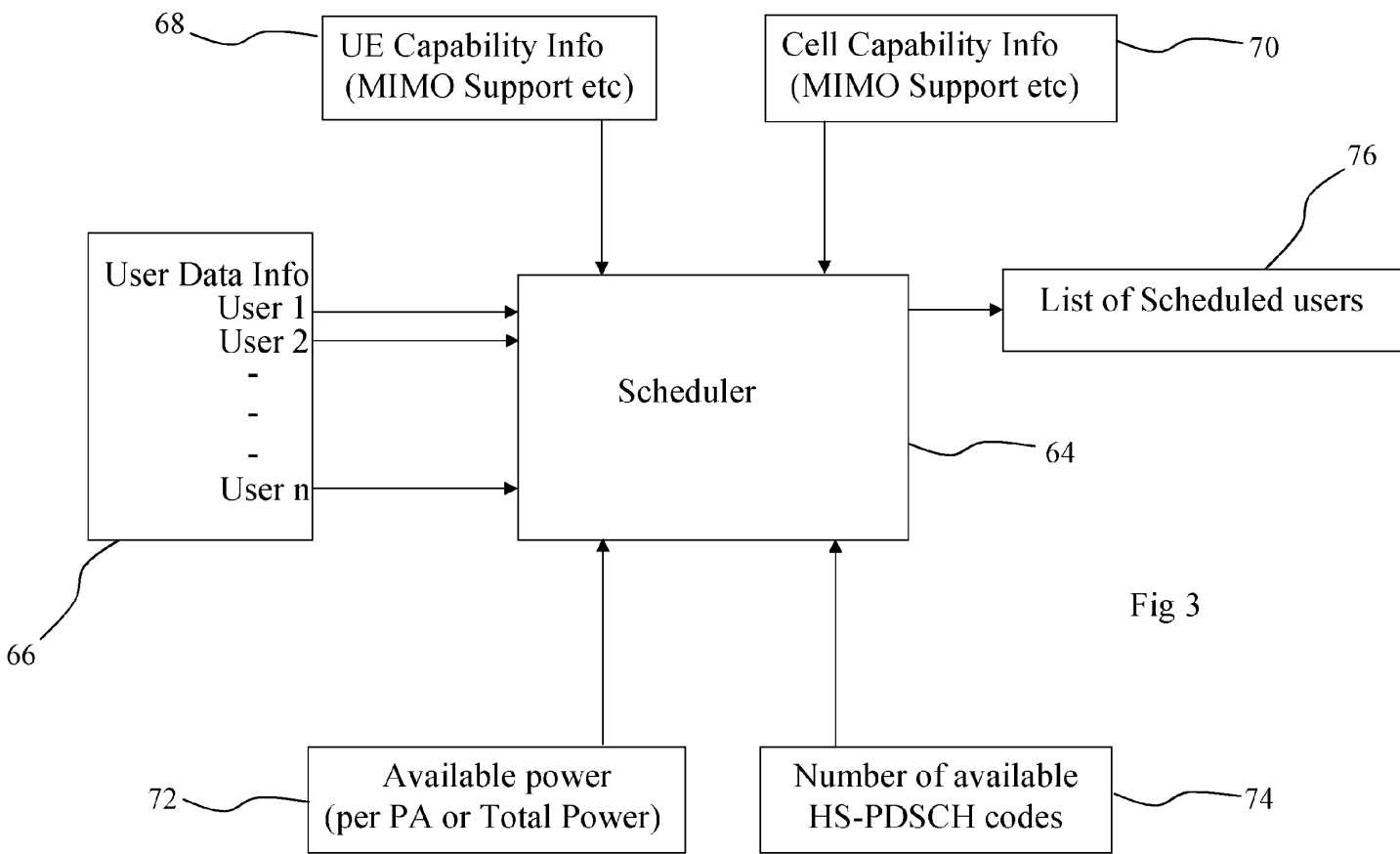
Fig 1

Fig 2

68 — UE Capability Info
(MIMO Support etc)

Cell Capability Info
(MIMO Support etc) — 70

76

User Data Info
User 1
User 2
-
-
-
User n

Scheduler

List of Scheduled users

64

66

Fig 3

Available power
(per PA or Total Power) — 72

Number of available
HS-PDSCH codes — 74

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