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**Ringström et al.**

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- (54) **ANTENNA DEVICE AND METHOD IN A MIMO SYSTEM**
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**H04L 25/49** (2006.01)  
**H04B 7/04** (2006.01)  
**H04B 7/06** (2006.01)

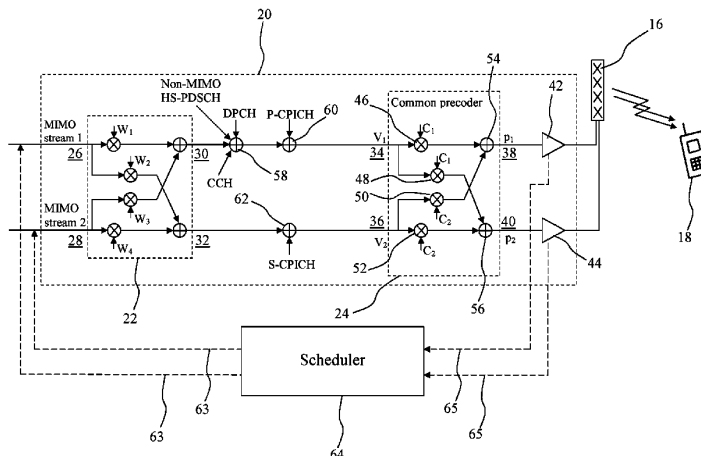
- (52) **U.S. Cl.**  
CPC ..... **H04B 7/0456** (2013.01); **H04B 7/0469** (2013.01); **H04B 7/0434** (2013.01); **H04B 7/0617** (2013.01)  
USPC ..... **375/297**; **375/295**; **375/296**

- (58) **Field of Classification Search**  
CPC ... H04B 7/0434; H04B 7/0617; H04B 7/0456  
USPC ..... 375/297  
See application file for complete search history.

(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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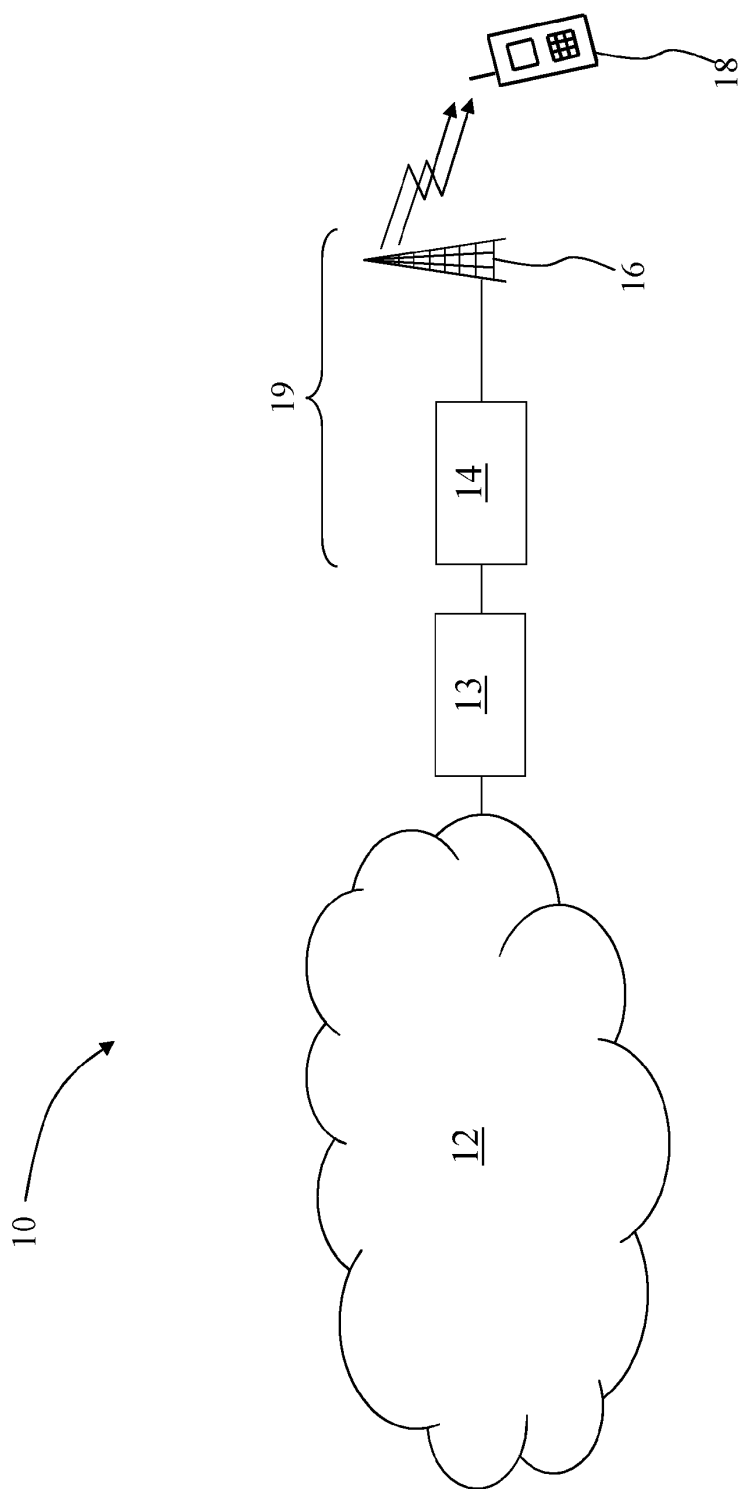


Fig 1

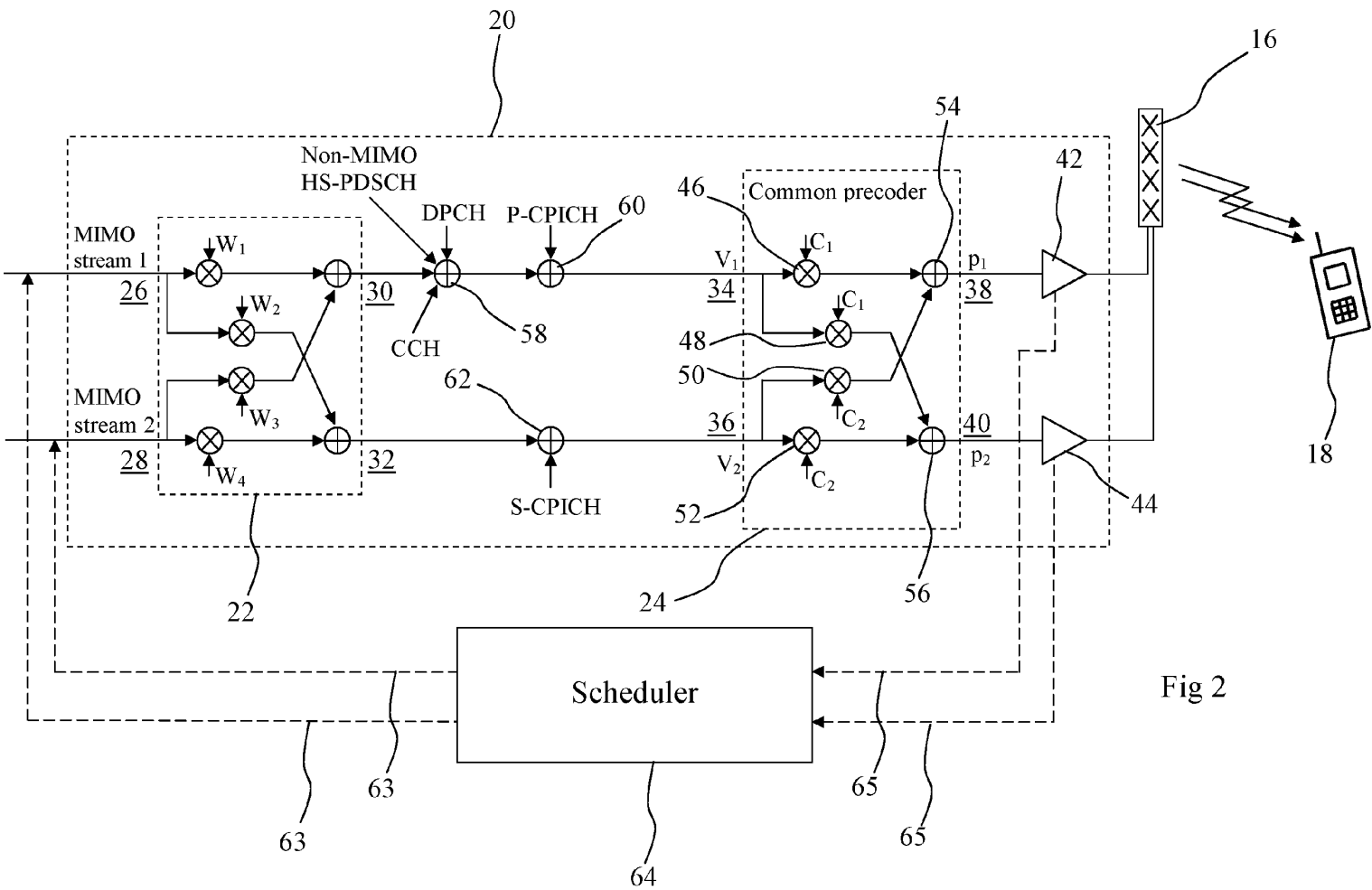


Fig 2

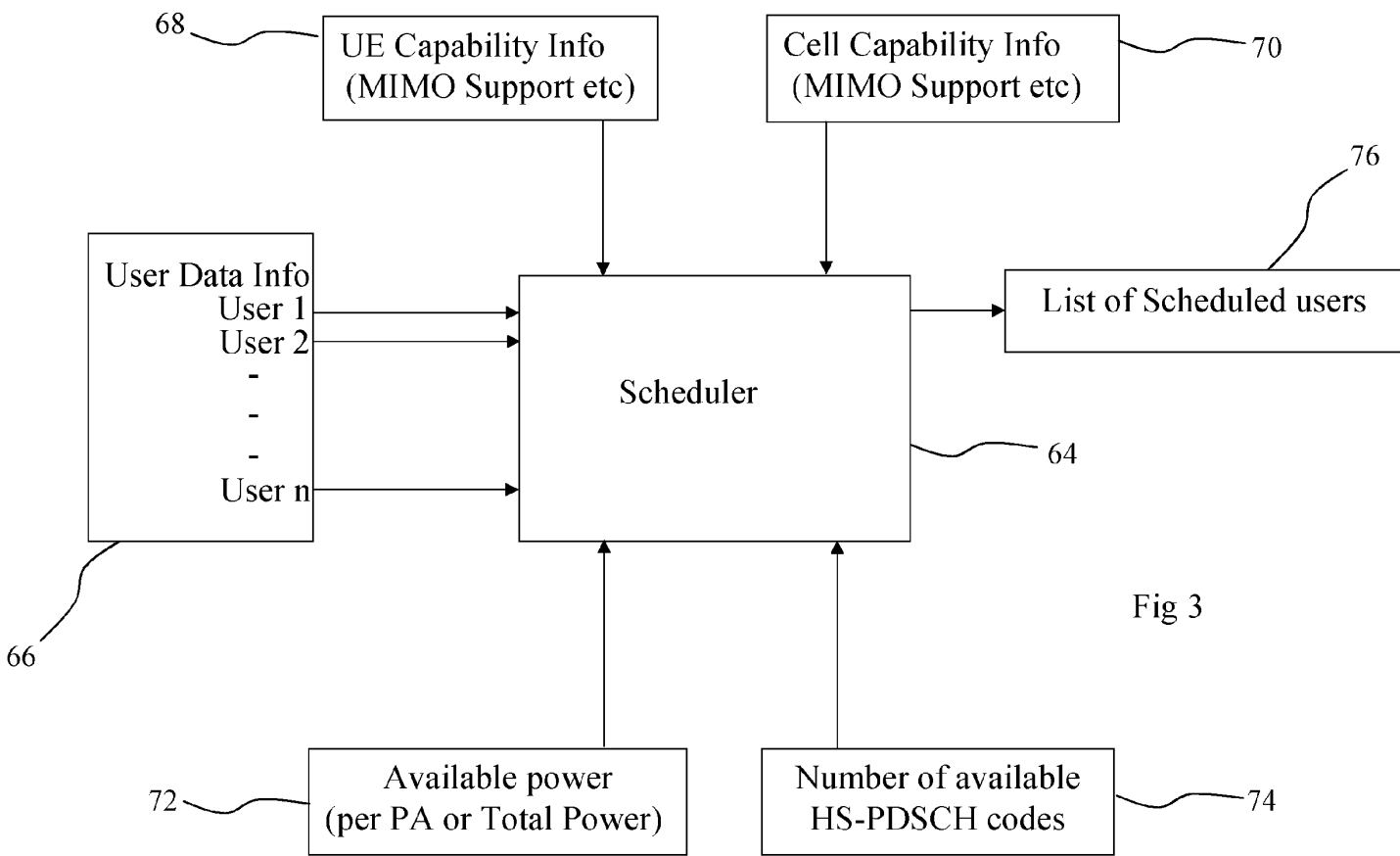


Fig 3

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