INTERFERENCE MANAGEMENT IN WIRELESS SYSTEMS

TECHNICAL FIELD

This patent document is directed generally to wireless communications.

BACKGROUND

Mobile communication technologies are moving the world toward an increasingly connected and networked society. The rapid growth of mobile communications and advances in technology have led to greater demand for capacity and connectivity. Other aspects, such as energy consumption, device cost, spectral efficiency, and latency are also important to meeting the needs of various communication scenarios. Various techniques, including new ways to provide higher quality of service, longer battery life, and improved performance are being discussed.

SUMMARY

This patent document describes, among other things, techniques for managing remote interferences caused by phenomena such as the atmospheric ducting phenomenon. The disclosed techniques allow wireless communication nodes to effectively mitigate such interference without negatively impacting the system performance.

In a first aspect, the present disclosure provides a method of wireless communication, comprising: transmitting, by a first communication node, a first reference signal that includes an interference status information in response to remote interference experienced by the first communication node, wherein the remote interference is between the first communication node and a second communication node, wherein the first reference signal is transmitted in preconfigured time periods, wherein the first reference signal is transmitted at multiple occasions in each of the preconfigured time periods, wherein transmissions of the first reference signal in the multiple occasions carry an ID information that is a same ID information in each of the multiple occasions, wherein the interference status information includes a first message that indicates to the second communication device that no further interference mitigation action is needed, or the interference status information includes a second message that indicates to the second communication device to further perform interference cancellation, and wherein each

occasion of the multiple occasions corresponds to a periodicity of transition between uplink and downlink communications of the first communication node.

In a second aspect, the present disclosure provides a method of wireless communication, comprising: receiving a first reference signal that includes an interference status information about remote interference between a first communication node and a second communication node, wherein the first reference signal is received in preconfigured time periods, wherein the first reference signal is received at multiple occasions in each of the preconfigured time period, wherein receptions of the first reference signal in the multiple occasions carry an ID information that is a same ID information in each of the multiple occasions, wherein the second communication node performs no further interference mitigation action in response to the interference status information including a first message, or the second communication node further performs interference cancellation in response to the interference status information including a second message, and wherein each occasion on the multiple occasions corresponds to a periodicity of transition between uplink and downlink communications of the first communication node.

In one example ~~aspect~~, a wireless communication method is disclosed. The method includes receiving, at a first communication node, interference status information indicative of a remote interference between the first communication node and a second communication node, and performing, by the first communication node, subsequent communications to the second communication node by implementing a backoff based on a granularity.

In another example ~~aspect~~, another method of wireless communication is disclosed. The method includes transmitting, by a first communication node, a first reference signal indicative of presence of remote interference between the first communication node and a second communication node, wherein time domain positions of the first reference signal includes one of a last symbol before a maximum downlink transmission boundary for transmissions between the first communication node and the second communication node, or an Nth symbol prior to the transmission boundary, where N is an integer greater than 1.

In yet another example ~~aspect~~, a method of wireless communication is disclosed. The method includes transmitting, by a first communication node, a first reference signal indicative of presence of remote interference between the first communication node and a second communication node, wherein the first reference signal is transmitted in preconfigured time periods and wherein the first reference signal is transmitted at multiple occasions in each time period and communicating an ID information associated with the first communication node using the first reference signal.

In yet another example ~~aspect~~, a wireless communication method is disclosed. The method includes transmitting, from a first communication node, a first reference signal related to a first interference on an inbound channel to the first communication node and a second reference signal related to a second interference on an outbound channel from the first communication node. The first reference signal and the second reference signal are transmitted in a non-overlapping manner.

In ~~yet~~ a third ~~another example~~ aspect, a wireless communication apparatus is disclosed. The apparatus includes a processor that is configured to implement a~~n~~ ~~above-described~~ method according to the first or second aspect.

In a fourth ~~yet another example~~ aspect, a computer- program ~~storage medium~~product is disclosed. The computer -program ~~storage medium~~ product includes code stored thereon. The code, when executed by a processor, causes the processor to implement a ~~described~~ method according to the first or second aspect.

These, and other, aspects are described in the present document.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 shows an example of a remote interference caused by an atmospheric ducting phenomenon.

FIG. 2 shows an example of interfered uplink frames caused by the atmospheric ducting phenomenon depicted in FIG. 1.

FIG. 3 shows an example of different frame structures used by different base stations with respect to the common understanding of the maximum downlink transmission boundary and the maximum uplink transmission boundary.

FIG. 4 is a block diagram representation of a portion of a radio station in accordance

with one or more embodiments of the present technology can be applied.

FIG. 5 is a flowchart for an example method of wireless communication.

CLAIMS

What is claimed is:

1. A method of wireless communication, comprising:

transmitting, by a first communication node, a first reference signal that includes an interference status information in response to ~~indicative of presence of~~ remote interference experienced by the first communication node, wherein the remote interference is between the first communication node and a second communication node,

wherein the first reference signal is transmitted in preconfigured time periods,

wherein the first reference signal is transmitted at multiple occasions in each of the preconfigured time periods,

wherein transmissions of the first reference signal in the multiple occasions carry an ID information that is a same ID information in each of the multiple occasions, ~~and~~

wherein the interference status information includes a first message that indicates to the second communication device that no further interference mitigation action is needed, or the interference status information includes a second message that indicates to the second communication device to further perform interference cancellation, and

wherein each occasion of the multiple occasions corresponds to a periodicity of transition between uplink and downlink communications of the first communication node.~~; and~~

~~communicating the ID information associated with the first communication node using the first reference signal.~~

2. The method of claim 1 wherein the ID information associated with the first communication node is an identifier of a set to which the first communication node belongs.

3. The method of claim 1 or 2, wherein the first reference signal is a remote interference management reference signal (RIM-RS).

~~4. A method of wireless communication comprising:~~

~~transmitting, from a first communication node, a first reference signal related to a first~~

~~interference on an inbound channel to the first communication node and a second reference signal related to a second interference on an outbound channel from the first communication node, wherein the first reference signal and the second reference signal are transmitted in a non-overlapping manner.~~

~~5. The method of claim 4, wherein the non-overlapping manner includes a dual cycle manner comprising a first cycle in which the first reference signal is transmitted and a second cycle that is non-overlapping with the first cycle in which the second reference signal is transmitted.~~

~~6. The method of claim 4, wherein the non-overlapping manner includes periodically sending the first reference signal and the second reference signal beginning at different offsets in each period.~~

~~7~~4. A method of wireless communication, comprising:

receiving a first reference signal ~~indicative of presence of~~that includes an interference status information about remote interference between a first communication node and a second communication node,

wherein the first reference signal is received in preconfigured time periods,

wherein the first reference signal is received at multiple occasions in each of the preconfigured time period,

wherein receptions of the first reference signal in the multiple occasions carry an ID information that is a same ID information in each of the multiple occasions, ~~and~~

wherein the second communication node performs no further interference mitigation action in response to the interference status information including a first message, or the second communication node further performs interference cancellation in response to the interference status information including a second message, and

wherein each occasion on the multiple occasions corresponds to a periodicity of transition between uplink and downlink communications of the first communication node.~~; and~~

~~communicating the ID information associated with the first communication node using the first reference signal.~~

~~8~~5. The method of claim ~~7~~4 wherein the ID information associated with the first communication node is an identifier of a set to which the first communication node belongs.

~~9~~6. The method of claim ~~7~~4 or ~~8~~5, wherein the first reference signal is a remote interference management reference signal (RIM-RS).

~~10. A method of wireless communication comprising:~~

~~receiving a first reference signal related to a first interference on an inbound channel to a first communication node and a second reference signal related to a second interference on an outbound channel from the first communication node, wherein the first reference signal and the second reference signal are received in a non-overlapping manner.~~

~~11. The method of claim 10, wherein the non-overlapping manner includes a dual cycle manner comprising a first cycle in which the first reference signal is transmitted and a second cycle that is non-overlapping with the first cycle in which the second reference signal is transmitted.~~

~~12. The method of claim 10, wherein the non-overlapping manner includes periodically sending the first reference signal and the second reference signal beginning at different offsets in each period.~~

~~13~~7. A wireless communication apparatus, comprising a processor configured to implement a method recited in any one or more of claims 1 to ~~12~~6.

~~14~~8. A computer program product having code stored thereon, the code, when executed by a processor, causing the processor to implement a method recited in any one or more of claims 1 to ~~12~~6.