US 20240214247A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0214247 A1**

ARIKAWA (43) **Pub. Date: Jun. 27, 2024**

(54) **COMMUNICATION SYSTEM, RECEIVER, EQUALIZATION SIGNAL PROCESSING CIRCUIT, METHOD, AND NON-TRANSITORY COMPUTER READABLE MEDIUM**

(71) Applicant: **NEC Corporation**, Tokyo (JP)

(72) Inventor: **Manabu ARIKAWA**, Tokyo (JP)

(73) Assignee: **NEC Corporation**, Tokyo (JP)

(21) Appl. No.: **18/538,140**

(22) Filed: **Dec. 13, 2023**

(30) **Foreign Application Priority Data**

Dec. 19, 2022 (JP) 2022-202562

Publication Classification

(51) **Int. Cl.**
H04L 25/03 (2006.01)

(52) **U.S. Cl.**
CPC .. ***H04L 25/03159*** (2013.01); ***H04L 25/03834*** (2013.01)

(57) **ABSTRACT**

A frequency domain conversion unit converts an input signal of oversampling of a first predetermined multiple into a signal in a frequency domain. A rate conversion unit converts a signal being multiplied by a coefficient by a frequency domain filter into a signal of oversampling of a second predetermined multiple. A time domain conversion unit converts the converted signal into a signal in a time domain. A gradient calculation unit calculates a gradient of a loss function for a filter coefficient by using an error back propagation method using, as the loss function, magnitude of a difference between a signal of oversampling of the second predetermined multiple being converted into a signal in the time domain, and a predetermined value determined by oversampling of the second predetermined multiple. A coefficient updating unit updates the coefficient of the frequency domain filter, based on the calculated gradient.