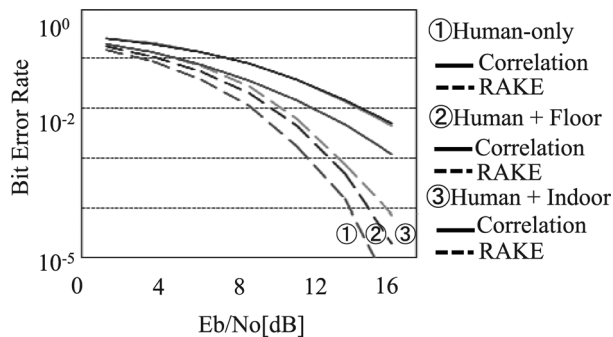


Table 3 Simulation parameters.

Transmission speed	50 Mbps
Modulation scheme	2PPM-TH-UWB
Pulse width	100 ps
Chip length	1.25 ns
Chips per bit	16
Receiver structure	RAKE

**Fig. 6** Average BER performance.

requires a E_b/N_0 of about 14 dB for the conventional correlation receiver, and a E_b/N_0 of about 8 dB for the four-finger RAKE receiver. In addition, a further simulation was done by combining the cluster 1 of the on-body channel and the IEEE802.15.3a CM1 channel [9] for simulating an additional indoor propagation characteristic. The BER degradation compared with the influence from the metal floor is only 1 dB at $BER = 0.01$. These results suggest that the high-speed transmission of 50 Mbps is possible in the on-body communication situation by the use of the RAKE receiver. Since the transmission speed of 10 Mbps may be enough when limiting it to the application of the healthcare and medical treatment, the influence of the multipath will be weakened and a further improvement of the BER performance can be expected.

6. Conclusions

This study aimed how to contain the environment reflection in a dynamic on-body UWB channel model. In addition to various human body postures, the reflection from the environment such as the floor was included. It has been shown

that the environment reflection does not basically affect the multipath components in the first cluster that are generated by the diffraction and reflection of the human body. It is available to establish a body area channel model by a combination of the on-body model and the additional components from the environment. Using the impulse response expression of the channel model generated in such a way, the average BER performance of a typical IR-UWB system has been clarified. It has been found that the degradation at $BER = 0.01$ is 2–3 dB due to the influence of the reflected waves from the environment. A high-speed transmission of 50 Mbps on the body surface is possible by the use of the RAKE receiver structure.

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