



Joint Press Release—for immediate release

**NTT DOCOMO and JR EAST Verify Stable 5G Communication
aboard ALFA-X Shinkansen Test Train Running at 360km/h**

—Setting the stage for advanced, high-value mobility aboard high-speed trains—

TOKYO, JAPAN, January 28, 2021 — NTT DOCOMO, INC. and East Japan Railway Company (JR East) jointly announced today that they have verified the stable operation of important 5G communication capabilities, including handover between base stations and the transmission of high-definition video data, in trials conducted aboard JR East's ALFA-X¹ Shinkansen test train running at 360km/h. The trials confirmed that it will be possible to ensure stable mobile communication environments on high-speed trains for the delivery of high-value mobile services.

DOCOMO has been working to confirm the feasibility of 5G communication in high-speed environments since 2017. For the newly announced trials, experimental equipment conforming to international standard and specifications established by the 3rd Generation Partnership Project (3GPP²) was put through various trials conducted for the first time in Japan aboard ALFA-X running at 360km/h.

In general, communication quality at high speed becomes unstable due to the influence of direct-path obstructions and the Doppler effect. This is especially true in the case of 5G, which uses relatively high frequency bands that are more sensitive to physical obstructions and the Doppler effect compared to lower frequency bands used in legacy mobile communication networks.

Specifically, the trials confirmed the following three results aboard ALFA-X running at 360km/h:

- Maximum data rates exceeding 500Mbps and 100Mbps in the downlink and uplink, respectively, were verified and highly stable communication at 100Mbps or higher was achieved over a distance of approximately 5km, confirming the possibility of practical, reliable communication.
- Successful handover was confirmed while maintaining data rates at 100Mbps or higher.
- Both 4K and 8K high-definition video data transmissions were achieved, confirming the possibility of stable, large-capacity data transmissions. The data volumes transmitted in a communication time of about 60 seconds were as follows:

	Download	Upload	Streaming
Amount of 4K data	30 minutes	7 minutes	60 seconds
Amount of 8K data	30 seconds	15 seconds	40 seconds

The trials confirmed that the newly developed 5G technology can stably transmit both 4K and 8K high-definition video in the ALFA-X running at 360km/h. Notably, the advanced capabilities of this new technology are expected to open up a wide range of high-value services for customers traveling on high-speed trains.

Trial Details

Trial period:	October to December 2020
Location:	Section of Tohoku Shinkansen Line between Sendai and Shin-Aomori stations
Running speed:	360km/h
Frequency:	4.85GHz (100MHz bandwidth)
Base stations:	Two base stations within proximity (1.0-1.5km) of the railway
Mobile station:	One mobile station aboard ALFA-X
Features:	Beamforming, Beam tracking, Seamless handover and Doppler shift compensation

DOCOMO and JR East will continue their collaboration aimed at providing practical, high-quality and high-value mobile communications environments aboard high-speed trains.

¹ ALFA-X: Advanced Labs for Frontline Activity in rail eXperimentation

² 3GPP is an international consortium comprising with seven telecommunication organizations engaged in developing standards for mobile communication systems.