

Research Trends and Results

Initiatives to Realize Simple ITS Spots

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(Key words) Simple ITS Spot, ETC2.0, electric field strength

1. Introduction

The Ministry of Land, Infrastructure, Transport and Tourism has installed road-vehicle communication use radio antennae (ITS Spots) to provide ETC2.0 service, mainly on major expressways throughout Japan, in order to mitigate congestion and improve traffic safety. ITS Spots can be used not only to supply road traffic information, but also to abstract and collect traveling history and related information (uplink information), to be used for road traffic related analyses.

The NILIM is studying policies to develop and popularize services that will link industry, academia and government using uplink information in order to broaden the use of ETC2.0 compatible car navigation systems and widen the collection of uplink information. This report introduces a proving test done to study machine specifications for simple ITS Spots intended for installation at off-road facilities such as ports, harbors and logistics bases (below referred to as, "Simple ITS Spots").

2. Characteristics of Simple ITS Spots

Unlike conventional ITS Spots that communicate with vehicles traveling non-stop, these will contract the radio communication area to that occupied by one vehicle assuming that they will communicate with vehicles that will either stop temporarily or move slowly past the ITS Spot. The goal is to lower the conventional radio output of 70mW to about 5mW in order to simplify the radio

base station application requirements.

3. Measurement results

The radio wave output and installation height etc. of the ITS Spots were varied on the NILIM test track to measure the electric field strength distribution. The figure shows the measured electric field strength distribution. It shows that even when the output was lowered to 2.3mW, if the antenna's angle of elevation is 23 degrees, it is possible to obtain a communication area of 3×3m that is assumed to equal the area of one vehicle, confirming that service is possible when the vehicle stops temporarily. And assuming that when a vehicle moves slowly at 20km/h, ETC2.0 service communication processing time is 1 second, a communication area of about 6m in the direction of progress will be necessary. The figure confirms that if the antenna's angle of elevation is 33 degrees, output of 2.3mW will ensure a 3×6m communication area, permitting the provision of services to vehicles traveling slowly.

4. In Conclusion

This proving test performed measurements by lowering the radio wave output of the conventional ITS Spots. In the future, in order to also simplify operating conditions, we must abstract necessary functions, make a simple ITS Spot prototype, and perform function and performance proving testing.

Figure Electric Field Strength Distribution (Unit: dBm)

