

The fundamentals of TETRA data

TETRA provides voice and data services efficiently because it has data capabilities integrated into its infrastructure and is supported by standard TETRA terminals. This is an economical alternative to providing dedicated radio resources for data. Flexible prioritising of voice and data services should always guarantee that mission-critical communications take priority.

TETRA Packet Data

TETRA provides IP packet data in a similar way to GPRS in GSM. Most transactional services work well using TETRA IP packet data with a one-slot gross bit rate of 7.2 kbit/s. This gives a net bit rate of 2.5-3.5 kbit/s for applications. That is sufficient for WAP and email, while images, fingerprints and slow-speed video can all be supported using compression.

TETRA IP packet data is supported by the same capacity and coverage plan as a basic TETRA voice network because the TETRA standard makes the most of any available capacity. TETRA IP packet data is already available in TETRA networks and is a standard feature of many TETRA terminals and applications.

TETRA multi-slot packet data

TETRA multi-slot IP packet data provides up to 28.8 kbit/s gross bit rate, which yields a bit rate of around 9 kbit/s for applications. This can provide an enhanced service for images, mobile email and low-speed video, although it can't match the GPRS service in GSM networks. The capacity and coverage of a basic TETRA voice network can support TETRA multi-slot IP packet data, but there are practical drawbacks.

Prioritised voice traffic may disconnect or pause a data session, for instance, so only additional radio capacity can improve the resulting quality of service for multi-slot packet data. At least one radio transceiver should be reserved for the multi-slot packet data service in each cell. This pushes up the number of carriers, causing an increase of up to 30% in the cost of network implementation and operation.

Multi-slot packet data also increases terminal power consumption. The battery life of a handheld four-slot packet data terminal operation time is dramatically reduced. This may not be an issue for vehicle-mounted mobile terminals, but the extra investment required for a four-slot implementation could still outweigh any improvements in the data service.

What about using a commercial GPRS service?

The obvious alternative to TETRA high-speed data is to use the GPRS service from a GSM operator and GPRS-capable GSM terminals. However, the key issue is service availability.

Only a dedicated PMR data service can ensure the availability of critical data at all times. Commercial networks could be overloaded by the public or damaged in times of crisis, which is just when the safety services need all their resources.

TETRA 2 - TETRA Enhanced Data Service

ETSI is currently defining TETRA Enhanced Data Service (TEDS), a new air interface standard to increase TETRA data speeds up to 30-150kbit/s. TEDS will be more than 10 times faster than multi-slot packet data.

TEDS will need significantly more radio spectrum and capacity than TETRA, so TEDS carriers will be dedicated to high-speed data and cannot be used simultaneously for voice. This will raise the cost of network upgrades in the same way as multi-slot packet data, although it will provide a significantly better service.

TEDS coverage at the highest speed will not be the same as TETRA coverage, so the highest-speed TEDS service will only be available over a limited range, although the service will be continuously available at a lower speed.

Enhanced data services need more radio spectrum and wider channels, so TEDS needs 50-150kHz compared to 25kHz for TETRA. In the public safety bands this spectrum is restricted, but 50kHz carriers are readily available. Such carriers could also be allocated in a frequency band other than that currently used by TETRA. Selecting a 50kHz band would make it possible to integrate TEDS into existing TETRA networks, so it is clearly the best choice.

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