



# The Advantages of Passive Probes in Telecom Networks

A White Paper from Telesoft Technologies

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## Executive Summary

This paper highlights the benefits of using passive network probes rather than internal access functions for the monitoring of fixed, wireless and IP telephony networks. Advantages of data filtering and real time extraction, cost and network stability are discussed. Passive probes form an overlay system completely independent from the underlying network. Their power and versatility means they are used in a huge variety of value added services (VAS) and operational support services (OSS) in applications from quality and fraud assurance programmes to billing services, roaming and location applications. Network operators and service providers are reassured that such services will not affect the core network function, whilst enabling the extra revenue and improved quality that these services bring. Because of this passive probes form an important part of the ever-increasing complexity of modern telecom networks.

## Active vs Passive Methods

There are two ways of monitoring a telephony network to extract data from it, either actively or passively as shown in figure 1. In an active methodology data can be obtained using the internal access functions of the network equipment, be it switch, gateway or wireless base station. Selected data flowing through the equipment is mirrored to the monitoring port and passed to a mediation function and on to a 3<sup>rd</sup> party application that uses the data.

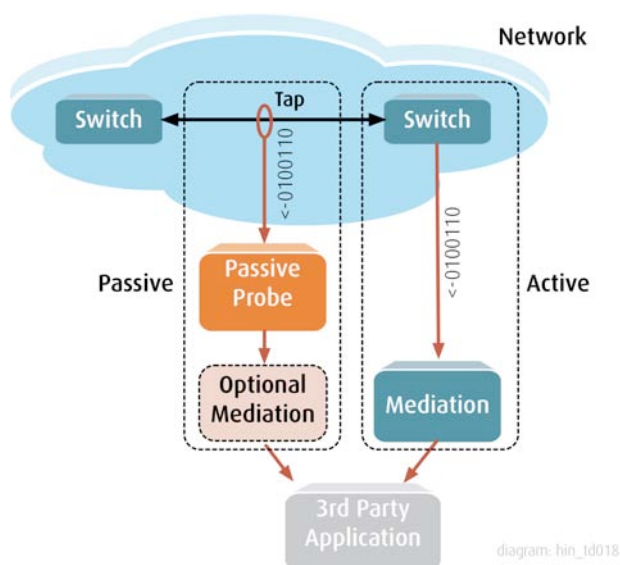


Figure 1: Active Vs Passive Methods

A passive probe on the other hand taps into the connections between the network equipment using an optical or electrical splitter to mirror the data flowing between and passing to a data acquisition function. With a fibre optic splitter (passive tap) the light beam is split into two beams filtering off just enough light to feed into a sensitive amplifier on the probe without affecting the main data link. The probe filters, grooms and passes on the data to 3<sup>rd</sup> party applications (described later). An optional mediation function may be deployed as an interface function, when multiple probes are required.

## Benefits of Passive Probes

Passive probes are an overlay system, working independently from the network equipment allowing a completely independent monitoring network to be built on top of the underlying data/telephony network. Active monitoring will increase the CPU and backplane load of the network equipment. Under extreme conditions where the CPU is already heavily loaded, filtering and mirroring data to a secondary port can cause data packets to be delayed or lost, causing quality of service issues.

An overlay system isolates software upgrades etc to the overlay system from core subscriber operations (and visa versa) ensuring that supplementary VAS/OSS type services that must be regularly updated do not affect essential network services that must operate with high reliability. With passive probes, the data acquisition function independently allows extensive computational filtering and manipulation of the data, either locally or centrally, without affecting the quality and resilience of the underlying network. Indeed it is this scalable processing power together with flexibility of probe placement that ensures a network independent probe is often the preferred choice.

In addition, some equipment vendors, particularly in 3G networks, simply don't include monitoring functionality on their equipment, or use vendor specific interface standards and make the licensing costs of it unpalatable to third parties in order to try to lock out competition and preserve market share. Passive probe techniques overcome such limitations, even allowing a mixture of some active and some passive probes, and open the market to innovative new services.

The main benefits of passive probes are summarised as:

- Overlay system: independent from operator equipment
- Powerful, allows complex filtering, mass monitoring, tracking of numerous targets etc without degrading or overloading operator equipment
- Scalable, can monitor a single E1/T1 to countrywide networks
- Access, does not require expensive port licensing of internal access functions or vendor specific interfaces
- Flexible, can be quickly updated for application needs without involving network operator. Allowing fast optimisation and maximum return on investment.
- Can perform bearer channel analysis, for example to correlate signalling to voice/data channels.
- Deep packet inspection can't be done integrally

## Applications

Information recovered from the network via probes can be used for a wide variety of value added services (VAS) and operational support system (OSS) applications.

Typical OSS applications include:

- Fraud management systems
- Billing systems
- Performance/load analysis
- Quality of service monitoring
- Network management
- E911 location, search and rescue
- Lawful interception requirements

Typical VAS applications include:

- Welcome note for roamers
- Missed call alerts
- Roaming services (steering etc)
- Location based advertising
- Location based information points
- 'Where am I?' / 'Where is?' location services

monitoring multiple data points a passive probe can correlate a range of events to filter specific data for the supported application. This allows application developers to correctly target a subset of subscribers based on any mixture of the targeting methodologies above.

## Privacy Issues

Local law, subscriber choice and accepted norms within a specific country usually limit the types of services that can be offered. It may be perfectly accepted, even desired, to broadcast an advert giving a 10% discount at a particular restaurant to all roaming subscribers entering a shopping mall in some societies, whilst in others it could be considered intrusive and restricted by law.

Many countries force operators and/or applications providers to offer an opt-in service (or opt-out service) to subscribers allowing them to control the choice of additional services they want. For instance you may subscribe to have a new ring tone downloaded once a week to your cell phone or to be able to pay for car parking or road tolls via your mobile. Other systems may track types of services a subscriber wants via a personal opt-in list. Here users add the services and/or numbers they wish to enable and implicitly block all other numbers and service types. Conversely subscribers can also be offered an opt-out list service explicitly blocking only those services or numbers they definitely don't want.

In addition operators and application providers must protect any user data they gather and ensure its use is restricted only to the intended application(s). Breach of privacy is treated as a serious offence in many countries.

## Telesoft Technologies HINTON Passive Probes

For twenty years Telesoft Technologies has been at the forefront of interfacing with telecoms networks, from the earliest computer telephony interface cards to today's IVR/Media Platforms and bulk SMS messaging systems.

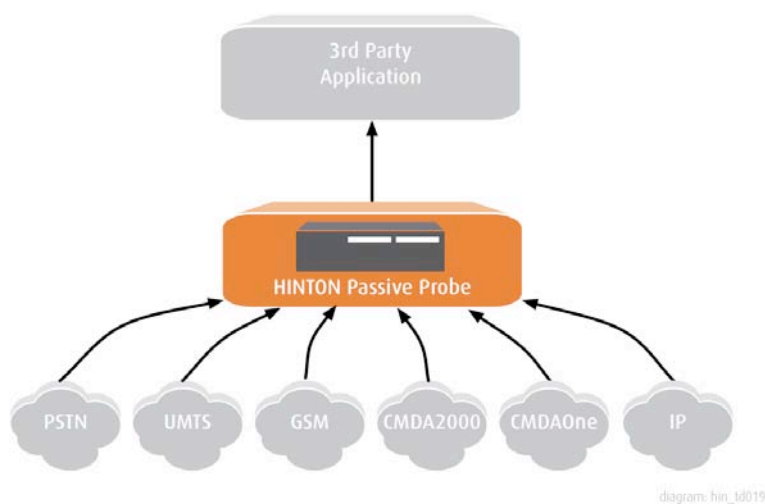


Figure 3: HINTON Passive Probe architecture overview

Telesoft Technologies HINTON passive probe product range includes:

- **HINTON Locator**, a probe product optimised for location, connecting in to GSM, UMTS, CMDAone and CMDA2000 networks it extracts information relevant to location applications (such as Cell ID, transmitter signal strength) allowing location based services software applications to be developed by third parties.
- **HINTON Monitor**, a general probe that used in both OSS such as fraud management, and VAS such as roaming services. It monitors fixed, mobile and IP networks to extract CDR and TDR information for third party application developers.