BOSCH

Invented for life

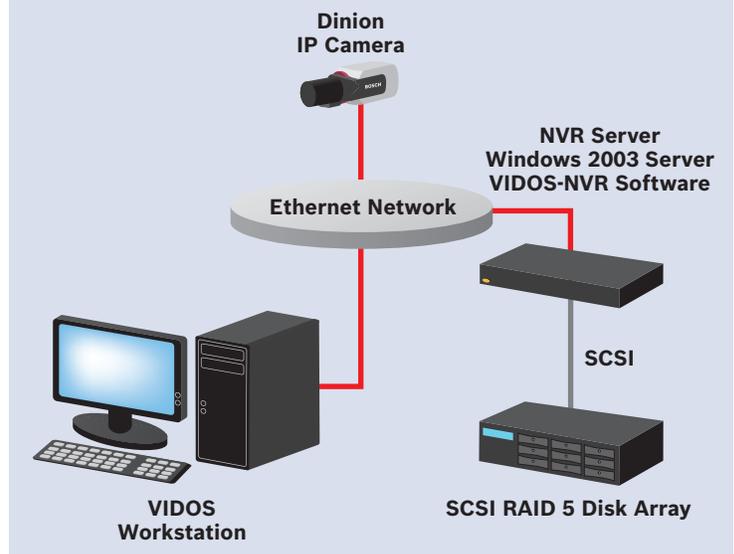# iSCSI Technical Brief
Technical Brief

What is iSCSI?

iSCSI, pronounced eye-skuzzy, is nothing more than a protocol, a standardized way to talk to IP-based storage across an IP network. In the context of Bosch's Video over IP portfolio, the *target* is iSCSI RAID storage, and the *initiator* could be say a Dinion IP or a VIP X-based encoder such as the VIP X1 or VIP X1600.

iSCSI combines the latest and greatest from the storage and communications worlds – SCSI storage (which uses the SCSI protocol) and the IP network (which uses the TCP/IP protocol). iSCSI is simply SCSI over IP. iSCSI stands for IP SCSI.
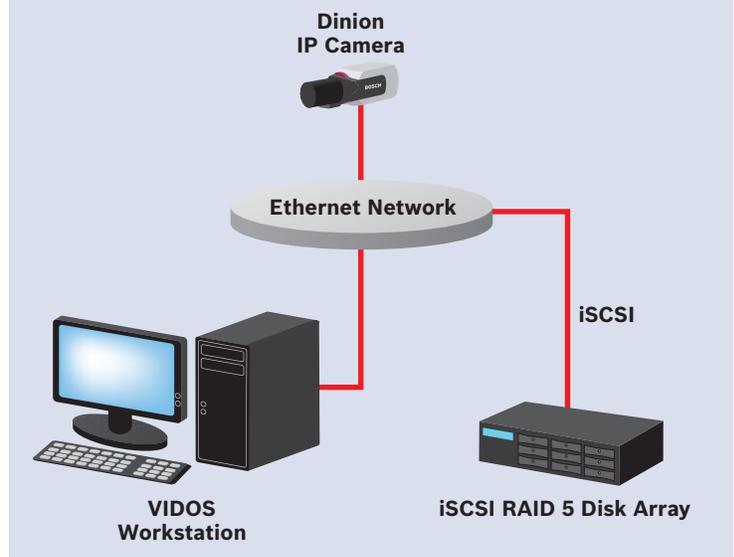
Until the Internet Engineering Task Force (IETF) invented iSCSI back in 2002, the main storage protocol was SCSI (Small Computer Systems Interface). SCSI is still the most widespread method of communicating with RAID, and is in fact used by Bosch to connect its NVR server (running Windows 2003 Server) to a SCSI RAID.

SCSI RAIDs are also commonly used to attach massive storage directly to DVRs, including Bosch's own Divar and DiBos.
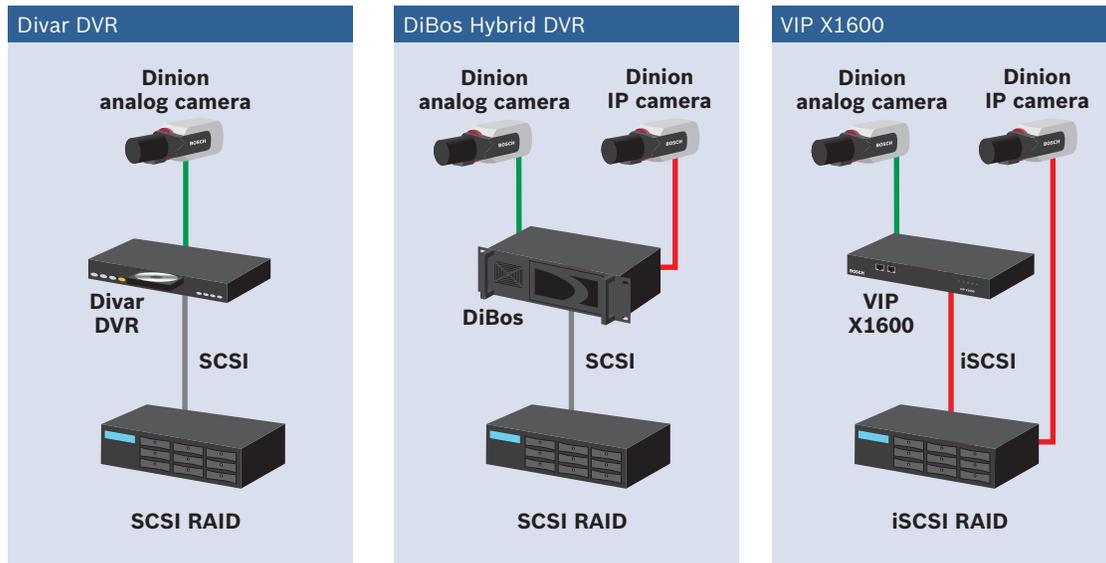
NVR-based typical application

Dinion
IP Camera

NVR Server
Windows 2003 Server
VIDOS-NVR Software

Ethernet Network

SCSI

VIDOS
Workstation

SCSI RAID 5 Disk Array

iSCSI-based typical application

Dinion
IP Camera

Ethernet Network

iSCSI

VIDOS
Workstation

iSCSI RAID 5 Disk Array

The Dinion IP shown represents either a Dinion IP or other VIP X based Bosch encoder

Divar DVR	DiBos Hybrid DVR	VIP X1600
Dinion analog camera	**Dinion analog camera** **Dinion IP camera**	**Dinion analog camera** **Dinion IP camera**
Divar DVR	**DiBos**	**VIP X1600**
SCSI	**SCSI**	**iSCSI**
SCSI RAID	**SCSI RAID**	**iSCSI RAID**

Comparing storage methods. Divar and DiBos DVRs can both use direct-attached SCSI RAID. The VIP X1600 uses the network to reach its storage – either a short direct network cable for Direct-Attached Storage (DAS) or via a network for shared Network-Attached Storage (NAS). Red lines indicate IP connectivity.

Why does Bosch Video over IP use iSCSI?

Bosch is using iSCSI in its latest VIP X generation of Video over IP technology for CCTV.

Flexibility
Because iSCSI is IP network-based RAID can be located anywhere on the high-speed network. This includes being share storage on the network (Network-Attached Storage) and dedicated storage independent of the network (Direct-Attached Storage).

Economy
Because the IP cameras and encoders communicate directly with the iSCSI RAID there is no need for a powerful NVR server, its Windows 2003 Server OS nor the NVR management software (VIDOS-NVR). The solution eliminates these components and is consequently highly cost-effective.

Reliability
There are no NVR server reliability issues, which can include internal hard drives, power supplies, fans and software.

Also, just like a DVR with a SCSI RAID, the VIP X1600 can use an Ethernet cable to connect to an iSCSI RAID and use it as direct attached storage. This means that video is recorded regardless of the health of the network or the amount of available bandwidth.

Maintainability
Since there are no NVR servers there no Windows OS patches or updates, VIDOS-NVR updates nor virus updates to maintain.

Also because everything is IP-based and all support Simple Network Management Protocol (SNMP), off-the-shelf IT applications and continuously monitor and alert in case of problems.

Scalability
Add more storage to the system by plugging more iSCSI RAID devices anywhere onto your network.

Who else uses iSCSI?

Nobody has managed to make their IP cameras or encoder speak directly to iSCSI RAIDs, neither as Network-Attached Storage nor as Direct Attached Storage. Firstly their hardware does not support dual NICs and so DAS is impossible, and secondly their IP cameras and encoders were not designed with iSCSI in mind, and it is very hard to implement retrospectively.

iSCSI is a very recent alternative for implementing Storage Area Networks (SANs), previously Fibre Channel (FC) was used, and still is, but although it has some benefits for very high end applications it is much more expensive and complex to configure as well as challenging to access remote devices.

Other CCTV manufacturers who use conventional NVRs are able to use SANs for their storage, which might include the use of iSCSI RAIDs as subsystems. However, this is not direct and so includes the costs, reliability and maintainability issues of such First Generation Video over IP architectures.

Because iSCSI uses TCP/IP, the omnipresent protocol that drives networking as we know it, researchers have overcome various challenges including the risk that packets will arrive in the wrong order and latency. One disadvantage with massive-scale iSCSI is CPU utilization on the Application server that is talking to it, however in the case of CCTV this is nothing more than a camera or a small encoder and so the scalability performance issue does not arise.

Global players including Network Appliances, EMC, HP, IBM, Hitachi, Microsoft and Dell fully support iSCSI. Notably Sun has recently done a 180 degree U-Turn compared to its position in 2002 and has now embraced iSCSI, yielding to market pressures.

Are there different kinds of iSCSI?

Although iSCSI is a standard it has been implemented differently by different iSCSI RAID manufacturers.

iSCSI initiators, usually a small number of very large application servers, are Microsoft Windows or Linux-based and they talk to an iSCSI SAN. In Bosch's case however the VIP X platform, the foundation of the IP cameras and VIP X family of encoders, is neither of these, neither is it proprietary. Bosch based its iSCSI stack on the publicly available open standard for iSCSI.

The high ratio of initiators to targets is a significant deviation from the original intention of iSCSI, and is what makes Bosch so unique. This also means that iSCSI RAID manufacturers are rapidly adapting their firmware on their appliances to reflect this brand new emerging market. Without this change, many manufacturers will only support only a few cameras per RAID – down to 4 cameras (8 simultaneous iSCSI connections) with one particular global manufacturer.

Compatibility Guide

Only the Bosch iSCSI RAIDs are supported. Compatibility with iSCSI RAIDs from other vendors is not guaranteed as Bosch has identified a variation in performance and feature sets across multiple suppliers.

	Model	Description
	NWC-0455 Dinion IP Camera	The NWC-0455 Dinion IP is a 1/3-inch CCD digital color network camera
	NWC-0495 Dinion IP Camera	The NWC-0495 DinionXF is a high-performance, 1/3-inch CCD Day/Night network camera
	VIP X1 Encoder, plus the audio and PoE variations VIP X1A, VIP X1P, VIP X1AP	High Performance Single Channel MPEG-4 Encoder
	VIP X2, VIP X2A, Encoders	High Performance Dual Channel MPEG-4 Encoder
	VIP X1600 Encoder	Modular, high-performance CCTV camera video encoder. Each VIP X1600 is a 4x4 unit that accommodates up to four hot-swappable modules – each with four analog audio/video inputs.

(All units shown support Bosch iSCSI storage)