

Polysmith® Sleep

In-lab polysomnography
and home sleep apnea
testing



Different Thinking for Better Healthcare.®

Nihon Kohden offers the most comprehensive array of products and services in the world to address the sleep diagnostic market.

We pioneered the first polysomnographs and continue to lead the way in developing cutting edge smart solutions for home sleep apnea testing (HSAT), polysomnography, combined EEG and PSG multi-modality tools, data management and IT compatible solutions.

At Nihon Kohden, we focus on workflow and delivering the latest and best technology to keep your lab running smoothly. We provide 24/7 knowledgeable product support and service because we understand that you rely on your equipment day and night. Quality and performance have been our priority for over 60 years, since we developed our first EEG technology.

Scheduling and Database

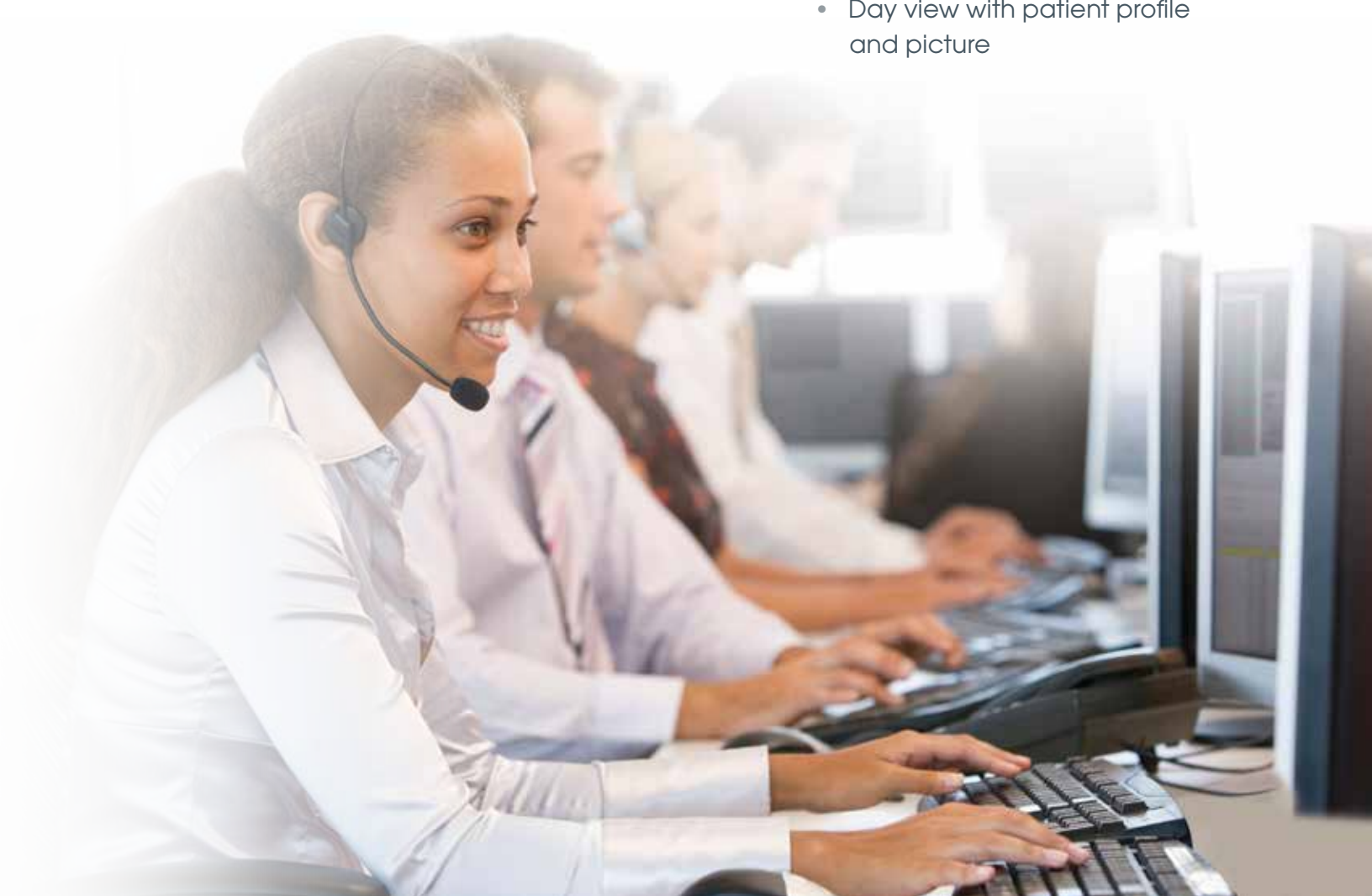
Simplify your scheduling and patient tracking needs with Polysmith DMS. Read HL7 ADT or orders from centralized scheduling and update patient and scheduling information automatically.

The convenient user interface keeps staff informed of the patient's study status. Utilize Polysmith PQ to electronically capture patient questionnaire information and update to the database. Polysmith DMS was designed to improve communication between staff members, facilitate scheduling, and provide quick access to information.

At Nihon Kohden, we understand the demands and budgetary constraints of a sleep lab. We continue to develop our product to maximize efficiency and streamline workflows, so you can focus on patient care and satisfaction.

Some of the features included in Polysmith DMS include:

- HL7 ADT/orders scheduling
- Polysmith PQ electronic patient questionnaire
- Manage scanned and electronic files associated with patient
- Priority and waitlist scheduling
- Icon coded patient and record status management
- Single click rescheduling
- Electronic notes
- Configurable date blocking
- Staff schedule management
- Day view with patient profile and picture



Administration and Lab Management

The administrative console is a simplified user interface that tracks and trends the performance of your lab and presents vital lab statistics without the need to create complex queries. It also displays the information in an easy to understand graphical format.

Some of the parameters covered by the administrative console include:

- Average time to each record status (recorded to scored, scored to interpreted, and interpreted to report completed)
- No show statistics
- Types of studies performed
- Most frequent diagnostic and billing codes
- Insurance provider breakdown analysis
- Percentage of studies turned around and not turned around in 24 hours, 48 hours, 5 days and 10 days
- Primary care, referring and reading physician synopsis
- Technician percentages

Data Acquisition

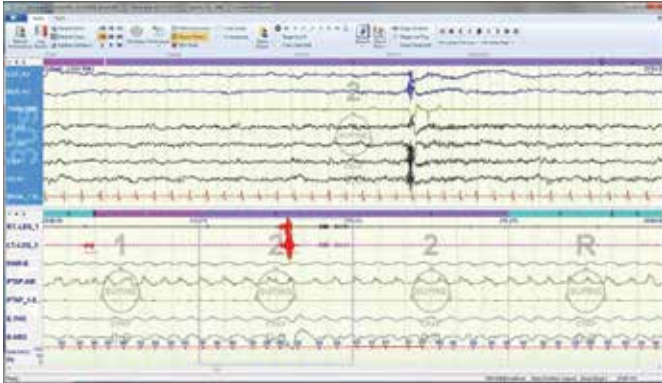
Seamless data acquisition is the basis for the Polysmith recording interface. A direct interface with Polysmith DMS scheduler to your site's centralized scheduling eliminates the need for patient information entry to initiate a recording. Simply right click on the patient's name to start a recording.

A configurable workspace allows the user to customize their workspace environment to best suit their role in the lab. Our full featured Polysmith program is used in a variety of sleep lab environments and provides a comprehensive approach to studying your patients. From our easy to use recording and scoring tools to customizable trend plots, Polysmith is designed to meet your data acquisition needs.

Diagnostics are the specialty of your sleep lab. These features help technologists manage their patients and data easier:

- Start a recording with a single click from the calendar
- Record video prior to starting acquisition
- Real time AHI and TST indicators
- Score study during acquisition with split window
- Capture impedance checks
- Selectable video and audio quality
- Auto append
- Dual screen support
- Automatic MSLT/MWT timer and recording tool
- Auto copy files to server or alternative media

Scoring and Patient Data



The technologist is an integral part of any sleep service operation. Night and day, technologists are tasked with patient care, collecting questionnaires and documents, data management, and scoring. With innovative tools in both Polysmith DMS and Polysmith software, the technologist's work day is made more manageable.

Polysmith assists the technician score and manage data with some of the following features:

- Stage assist scoring*
- Snap Trend Plot
- Digital Video playback during acquisition
- Custom Events wizard
- One-Click editing
- Configurable keyboard and mouse commands
- Customizable workspaces
- SpO₂, EtCO₂, transcutaneous CO₂, and Ph artifact editing
- Configurable watermarks
- Status tracking
- File size management
- Video clipping and annotation
- Multiple time bases with Time Guide

*Stage Assist™ maximizes technician efficiency by reducing scoring times. Polysmith autoscores the study and Stage Assist presents the scorer with the epochs with a low auto score confidence rating. Using Stage Assist, the scorer can efficiently use their scoring knowledge to make difficult scoring decisions and leave the more mundane staging to Stage Assist.



Physician Interface

Remotely access your data with Citrix compatible Polysmith, Polysmith DMS, and Surveysmith Report Viewer. With HL7 compatibility, electronic signature, and dropdown dictation fields, Surveysmith Report Viewer creates an efficient environment for the physician on the go. Physicians can verify Surveysmith report data using the exclusive hyperlinked report function. Check report values against the raw data at the click of a mouse. Integrating all aspects of the patient's evaluation through Polysmith DMS gives the physician the ability to access a patient's study status without being in the lab or picking up a phone.

We take into consideration the demands placed on the reading physician when designing our software and services for healthcare providers.

For those who thrive on accessibility and an intuitive user interface, Polysmith offers the following conveniences:

- 24/7 phone support
- HL7 Results interface
- Customizable reports
- Hyperlink data fields navigate to exact study location
- Electronic signature
- Airway Pressure Prescription interface
- Desaturation analysis which can calculate and report desaturation events in bins of $\geq 2\%$, $\geq 3\%$, $\geq 4\%$ and $\geq 5\%$
- ASV reporting
- Access electronic document attachments and Polysmith PQ questionnaires
- High resolution trend plots
- Programmable normative data
- Customizable electronics questionnaires
- Discrete HL7 results
- Configurable Trend Snapshot
- ICSD-3 coding

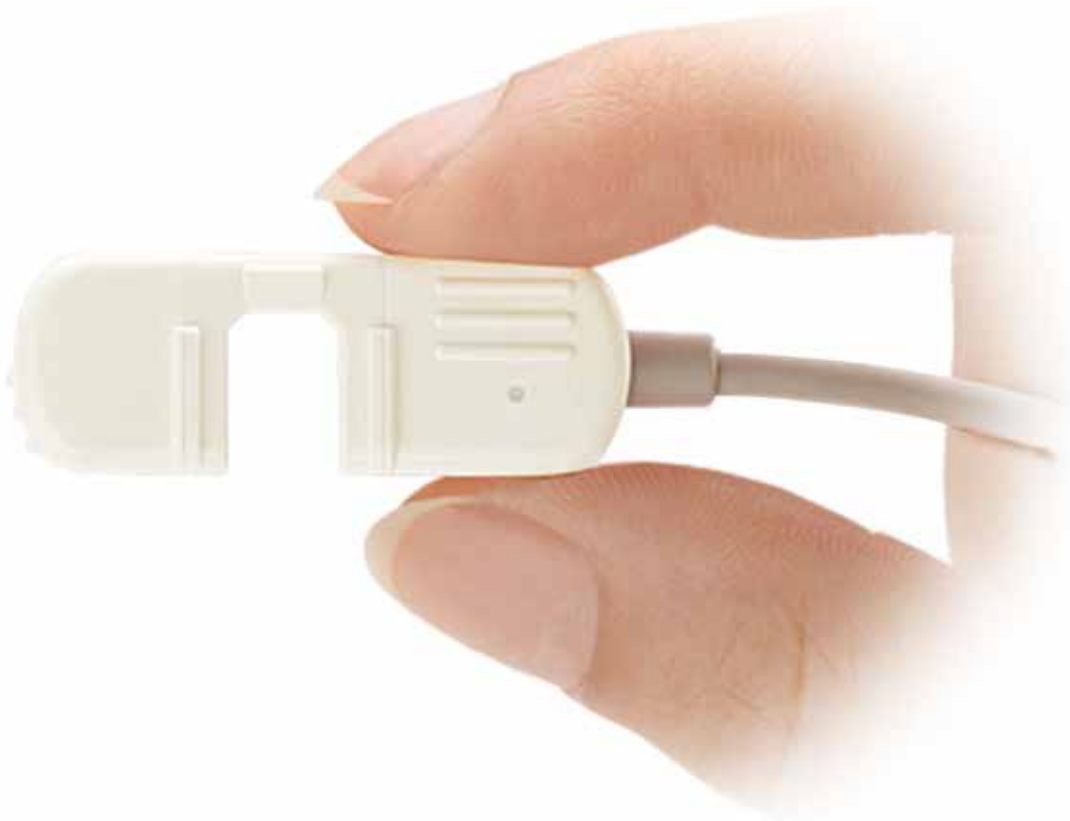


Cap-ONE End Tidal CO₂

The Nihon Kohden legacy of creating industry changing technology includes the invention of Pulse Oximetry in the late 1970's and continues today with cap-ONE (capnography-Oral Nasal Expiration) mainstream EtCO₂. In an effort to overcome the difficulties of monitoring carbon dioxide in different environments, the engineers at Nihon Kohden developed a miniaturized main stream EtCO₂ sensor for cap-ONE. The goal of this new development was not only to create technology that could monitor EtCO₂ in the critical care environment, but also to create a solution that could better monitor CO₂ in polysomnography. The TG-970 sensor represents the new generation of miniaturized main stream EtCO₂ technology. The result improves the way CO₂ is monitored and interpreted.

Benefits of the cap-ONE EtCO₂ system include:

- Integrated pressure transducer interface
- Instantaneous EtCO₂ waveform and values
- Very low dead space for added accuracy
- No water traps or condensation problems
- Smallest and lightest mainstream EtCO₂ device
- Built-in interface to JE-921, PSG-1100A and JE-120A amplifier
- Stand-alone OLG-2800 model with DC output channel interface



Multi-modality EEG/PSG Systems

Multi-modality electrodiagnostic equipment represents increased value for hospitals that want to add polysomnography to their existing neurodiagnostic services when space is at a premium and reimbursements are declining.

Nihon Kohden offers a full range of hardware and software features to fit your needs by providing easy to use analytical software, flexible montages, built-in SpO₂ and EtCO₂, photic and more.

To meet your epilepsy monitoring needs, as well as expand your PSG capabilities, the EEG-1200 multi-modality system can provide your facility with standard and expanded recording solutions of 64, 128, or 256 channels.

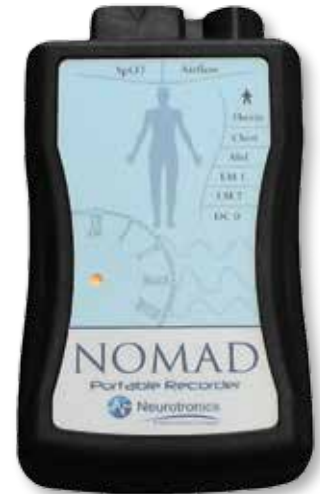
Add polysomnography to your EEG/EMU environment and Nihon Kohden can add the following benefits:

- Simultaneous scrolling of live PSG and EEG data in separate montages
- Separate recording modalities for EEG and PSG
- Spike and seizure analysis
- Selectable video and audio quality
- Photic stimulation
- Real time quantitative EEG trending
- Segment PSG studies from long-term monitoring data
- Compatible with amplifiers ranging from 27 to 256 channels



Home Sleep Apnea Testing

Record and track your home sleep apnea testing (HSAT) studies via Polysmith DMS. Our Type II (Trackit™ 18+8 and Sleepwalker™) and Type III (Nomad®) recorders use the same interface as our in-lab studies for scheduling, initialization, download and scoring. A common interface reduces training time and facilitates better tracking of your sleep records and interpretations; thereby increasing efficiency. Rest assured, you can expect that our HSAT devices incorporate signal quality, reliability and durable construction, the hallmarks of Nihon Kohden products.



HSAT Device Features

FEATURES	NOMAD	TRACKIT SLEEPWALKER	TRACKIT 18+8
Number of Channels:	12	17	18 ref and 8 poly
EEG:	N/A	4	Assignable
EOG:	N/A	6 poly	Assignable
Airflow Channels:	Therm and pressure	Pressure	Assignable
Snore:	Yes	Yes	Assignable
Respiratory Effort:	2	2	Assignable
Built-in Body Position:	Yes	Yes	No
Built-in SpO2:	Yes	Yes	Optional
Limbs:	2	Assignable	Assignable
DC Channels:	1	4 optional	4 optional



Amplifiers

Meet your sleep recording needs with Nihon Kohden amplifiers. We offer PSG compatible amplifiers ranging from 27 to 256 channels:

Sphinx PMU710

The Sphinx PMU710 is the latest addition to the Nihon Kohden family of amplifiers. Designed to meet the AASM's essential recording parameters, the Sphinx also incorporates unique features.

- Built-in pressure transducer
- Quick disconnect
- IP Addressable
- VESA wall-mount
- Full AASM channel set
- Built-in intercom/microphone
- Nihon Kohden SpO₂
- 6 DC inputs (expandable to 14 DC channels)



PSG-1100 Amplifier

The PSG-1100™ is designed with enhanced features with the quality and reliability you have come to expect from Nihon Kohden.

- 100 M Ω input impedance
- IP addressable
- 25 EEG (full 10-20 montage)
- Dedicated body position, EOG (2), ECG (3 with reference) and Chin EMG (3)
- 8 bipolar pair inputs
- Internal SpO₂
- Internal mainstream EtCO₂
- Internal data storage
- Built-in power isolation
- 6 DC inputs (expandable to 14 DC channels)





JE-921

The JE-921 amplifier provides the flexibility and configurability of a multi-modality system. This amplifier is available as a dedicated PSG system or a multi-modality EEG/PSG system.

- Full 10-20 montage
- 32 channels
- 4 pairs of mono/bipolar channels
- 3 pairs of bipolar channels
- Internal SpO₂
- Internal mainstream EtCO₂
- 4 DC inputs (expandable up to 12 DC inputs)



JE-120

Nihon Kohden sleep solutions are compatible with our EEG high definition amplifiers giving you the flexibility to record high density EEG from 64-256 channels. The JE-120 gives you the ability to perform sleep studies simultaneously with long-term EEG monitoring.

- IP addressable
- Internal SpO₂
- Internal EtCO₂
- 200 M Ω input impedance
- Internal data storage
- Built-in power isolation
- Combination EEG/PSG with dual data streaming
- Clip out PSG and leave LTM intact
- Optional 16 DC inputs



Amplifier Specifications

Sphinx PMU710



Number of Inputs:

- 6 x DC Inputs
- 2 x Audio Jacks (microphone/speaker)
- 1 x Microphone (audio recorded with video and data)
- Magnetic Isolation

Input Impedance:

$\geq 20 \text{ M}\Omega$

CMRR:

$\geq 100 \text{ dB}$

Internal Noise Level:

$< 2\mu\text{V}$ (0.1 – 60 Hz)

Filter Bandwidth:

0.072 Hz ~ 300 Hz

Offset Tolerance:

$\pm 300 \text{ mV}$

A/D Conversion:

16-bits for all Channels

Sampling Frequency:

250 Hz, 500 Hz or 1000 Hz

JE-912 PSG



Number of Inputs:

- 20 Unipolar
- 14 Bipolar
- Optical and Magnetic Isolation

Input Impedance:

$100 \text{ M}\Omega$

Input Circuit Current:

$> 5 \text{ nA}$

CMRR:

$> 105 \text{ dB}$ at 60 Hz (bipolar input
60 dB or greater)

Internal Noise Level:

$< 1.5\mu\text{Vp-p}$ (0.53 to 60 Hz)

High-Cut Filter:

120 Hz (-18 dB/oct)

Low-Cut Filter:

0.08 Hz (TC=2 s)

Offset Tolerance:

$600 \pm \text{mV}$

Sampling Frequency:

Up to 500 Hz

USB Interface

Cat5 Connectivity

JE-921 10-20



Number of Inputs:

- 32 Channels Total
- 10-20 Input Layout
- 3 Dedicated Bipolar Channels
- 4 Programmable Bipolar Channels
- 4 DC Channels
- Optical and Magnetic Isolation

Input Impedance:

$100 \text{ M}\Omega$

CMRR:

$> 105 \text{ dB}$

Internal Noise Level:

$< 3\mu\text{V p-p}$ (0.53-120 Hz)

High-Cut Filter:

300 Hz (-18 dB/oct)

Low-Cut Filter:

0.016-160 Hz

Sampling Frequency:

Up to 1000 Hz

USB Interface

Cat5 Connectivity

Nomad Type III



Battery Type:
2 x AA Batteries

Weight:
155 g (without batteries)

Size:
11.75 cm x 7.24 cm x 2.54 cm
(L x W x D)

ADC Resolution:
16 bits

Inputs:

- 5 Bipolar Inputs
- 2 Respiratory Effort Channels and Thermocouple
- 2 Limb Movement Channels
- 1 DC Input
- Integrated Nonin SpO₂
- Integrated Body Position Sensor
- Pressure Transducer Channel with Derived Shore Channel

Sampling Frequency:
Up to 250 Hz

PSG-1100



Inputs:

- EEG 25
- CHIN EMG 3
- 3 EKG Inputs Plus Reference
- 16 Bipolar Inputs
- 6 DC Channels, Expandable to 14 DC Channels
- Internal SpO₂
- Internal EtCO₂ (wave and value)
- ADC 16 bits
- Magnetic Isolation

Input Impedance:
100 M Ω

CMRR:
>105dB at 60 Hz

Internal Noise Level:
<1.5 μ Vp-p (0.53 to 60 Hz)

JE-120



Number of Inputs:

- 256
- 4 Bipolar (with JE-125 input box)
- 1 Common Reference (with JE-125 input box)
- 16 DC Channels
- Optically Isolated

Input Impedance:
200 M Ω

CMRR:
>110dB (EEG input box)
>100dB (bipolar input jack)

Internal Noise Level:
<1.5 μ Vp-p (up to 120Hz)

High-Cut Filter:
15 to 3000 Hz (-18dB/oct) Sample Rate Dependent

Low-Cut Filter:
0.016 to 160 Hz (-6dB/oct)

Clinical Sampling Frequency:

- 100, 200, 500, 1000, 2000 Hz All 256 Channels
- 128 channels at 5000 Hz and 64 channels at 10,000 Hz

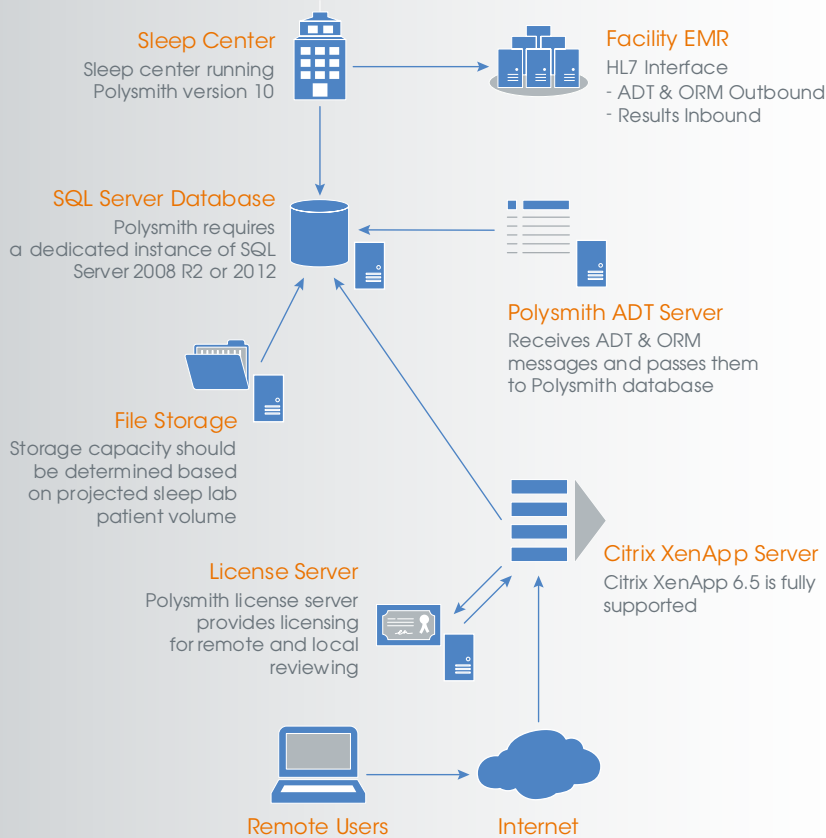
Research Stream Sampling Frequency:
200, 500, 1000, 2000, 5000, and 10,000 Hz All Channels

IS/IT Features

Today's sleep lab is increasing its dependence on the IS/IT department to provide security, remote access, connectivity throughout the lab and an interface with medical records.

Polysmith provides a scalable enterprise solution that can accommodate a single site to a multi-center organization.

Polysmith System Diagram



- Citrix compatible
- HL7 ADT/results interface improvements
- Windows® 7 compliant
- Windows Server 2008 r2, 2012, and 2012 r2 compliant
- Verify Server software
- Active directory
- MSSQL® database
- Auto copy—copy files to a central location immediately after the study is collected. A backup copy resides on the local computer and is automatically deleted after a user defined period.
- Remote physician access to live patient recording