

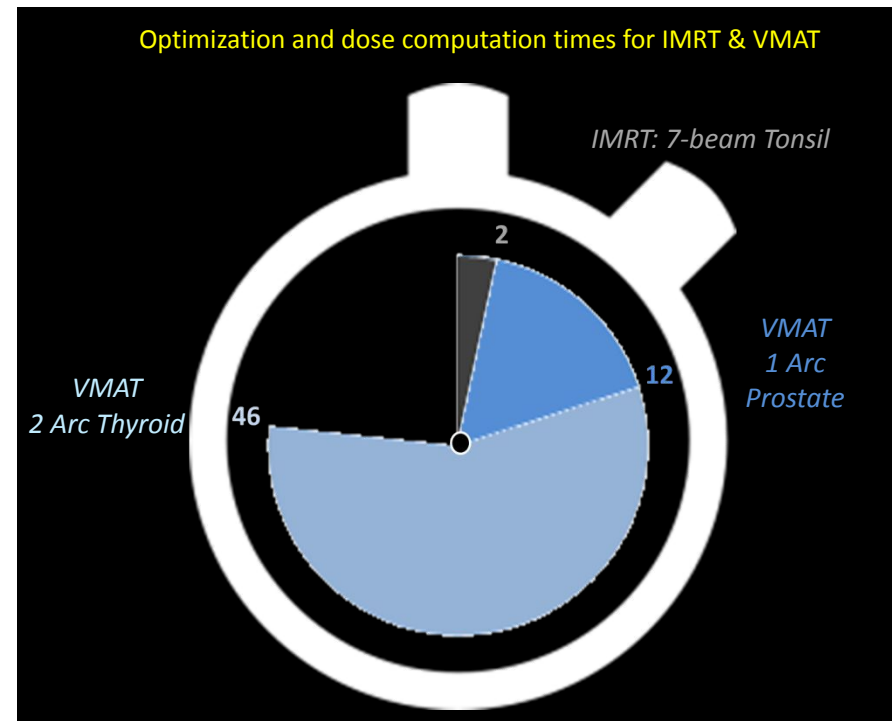
# Pinnacle<sup>3</sup> Platforms



# Today's challenges for planning systems

Conventional hardware platforms are no longer adequate

- **Planning process more computationally intensive**
  - Introduction of VMAT planning and increasing use of automation demand more resources
- **Staff are more mobile**
  - Require access to treatment planning system from multiple locations without compromising performance
- **Departments under pressure to reduce costs**
  - Want to scale investment to the need of the clinic, reduce downtime & maintenance costs



Times shown in minutes.  
Computed in Pinnacle<sup>3</sup> 9.6 with 810 workstation  
4mm dose grid resolution • Adaptive Convolve & SVD dose engines

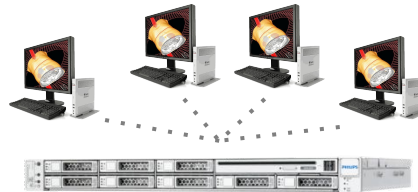
# Pinnacle<sup>3</sup> Platforms

Enhanced performance with centralized computing

Expert

Professional

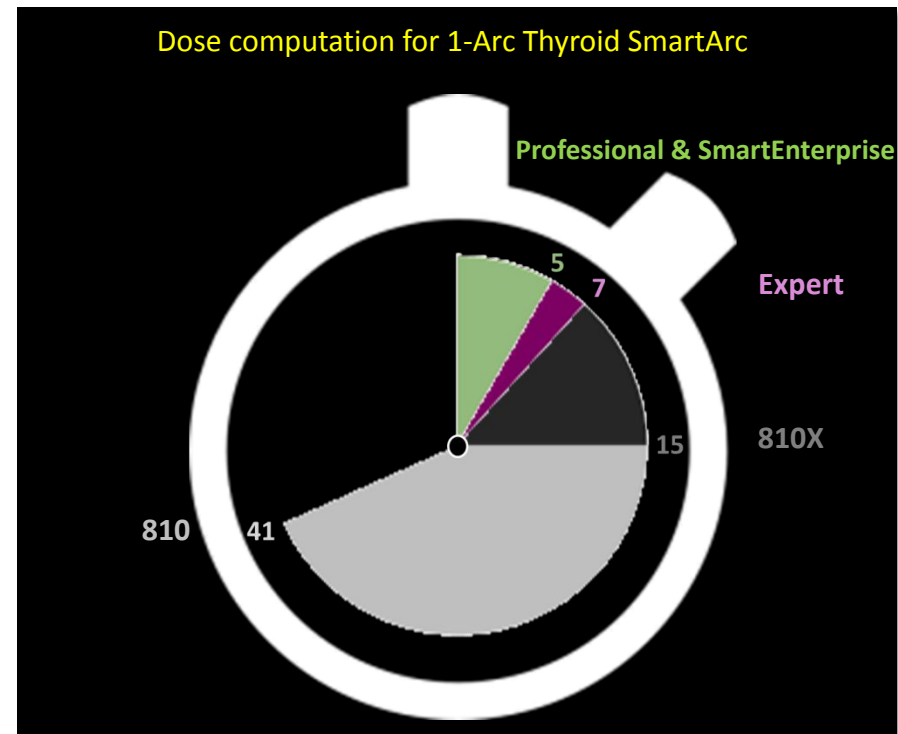
SmartEnterprise



# Pinnacle<sup>3</sup> Platforms

Enhanced performance with centralized computing

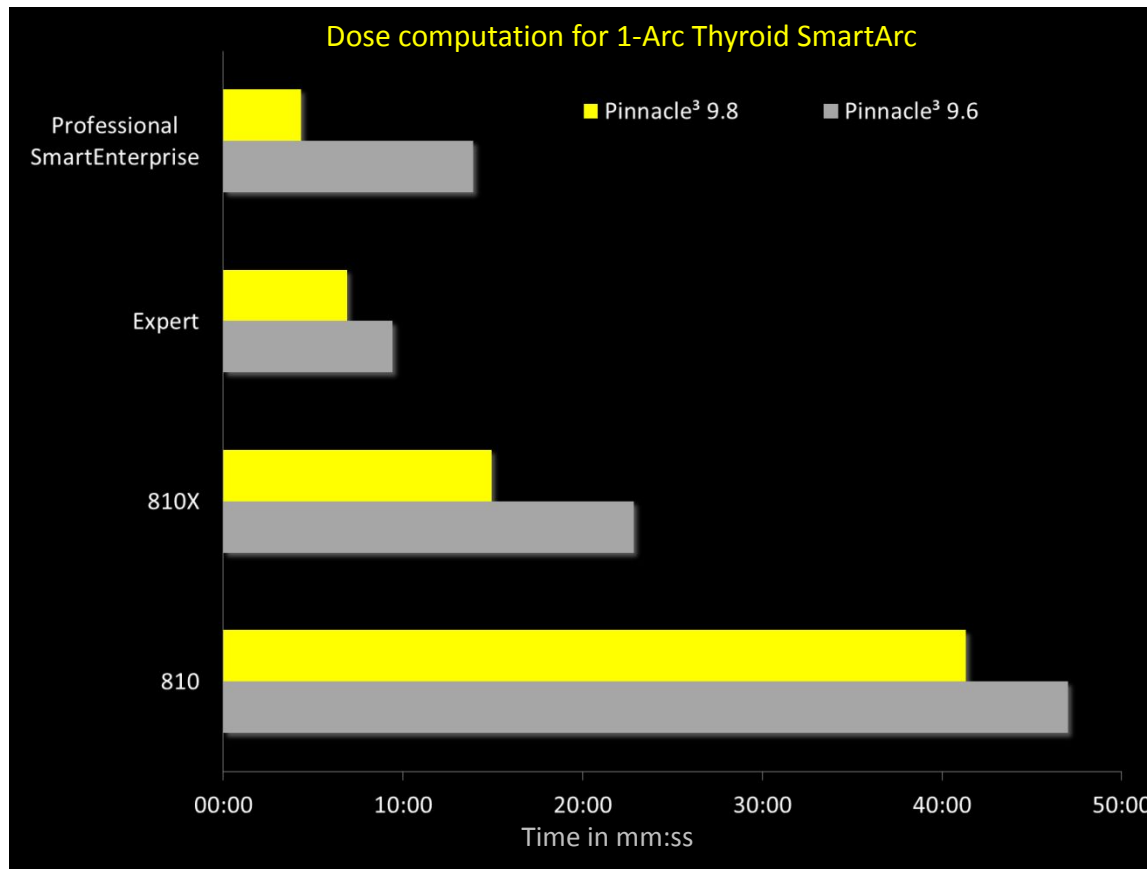
- Faster treatment planning
  - Improved computation speeds
- Improved access
  - Access to all Pinnacle<sup>3</sup> applications
  - Improved performance at lower bandwidths
- Reduced operational costs
  - Thin Clients replace independent workstations: reduced license fees & maintenance needs



Times shown in minutes.  
Computed in Pinnacle<sup>3</sup> 9.8 – 2mm dose grid resolution  
Collapsed Cone dose engine

# Faster Treatment Planning

Newer platforms and Pinnacle<sup>3</sup> releases increase calculation speed



*Computed with 2mm dose grid resolution & Collapsed Cone dose engine*

# Improved Access

## Potential to speed up the treatment planning process

- **Enhanced resources for all**
  - The power of the server is available to all the thin clients allowing faster planning independent of the access point
  - The Pinnacle<sup>3</sup> modules are available across all clients
- **Flexible access from a variety of devices**
  - Supports existing workstations, Sun Ray thin clients, PCs and MACs\*
  - \*Mac support for English, French, German and Dutch localized keyboards only*
- **Improved performance at low-bandwidths**
  - Faster refresh rates for interactive work, like contouring, with Virtual Client Connection (VCC)
  - Tested down to 10 mbps to support remote access



*Stop fighting over the fastest workstation*

# Reduced Operational Costs

High reliability and low maintenance with thin clients

- **Hardware Clients**

- Sun Ray deployments are virtually plug-and-play
- No maintenance vs. workstations and PCs
- Absence of moving parts (e.g. hard drives) reduces risk of failures
- Sun Rays consume 98% less power than workstations

- **Software Clients**

- Leverage PCs or MACs with Virtual Client Connection (VCC)

- **Secure and portable planning**

- SmartCards enable portable connectivity
- No patient data on SmartCards – maintaining data security



# Pinnacle<sup>3</sup> Expert

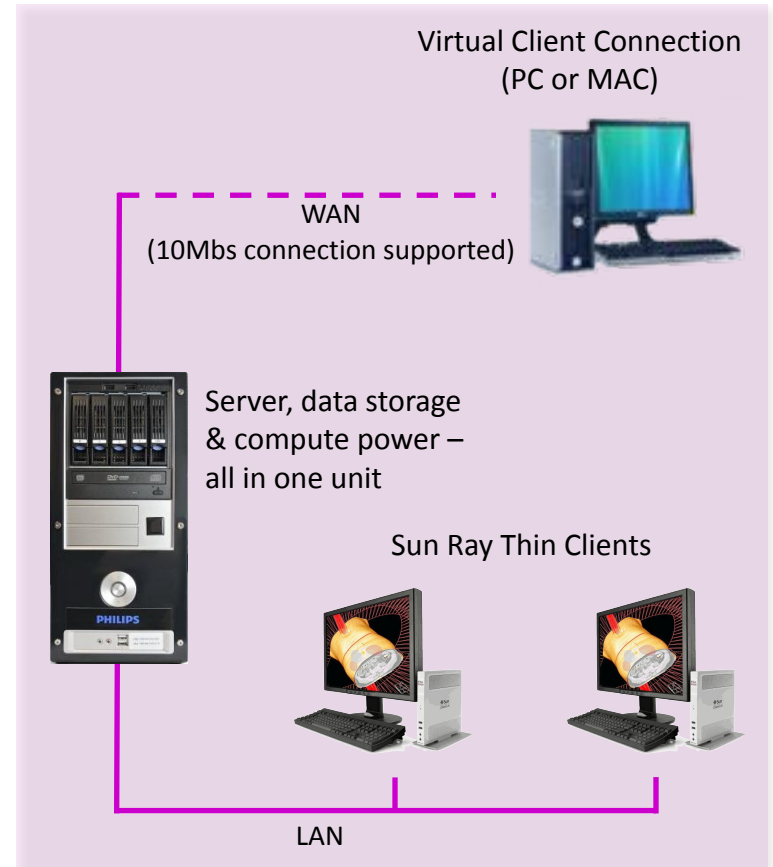




# Deployment

Designed to meet the needs of the smaller center

- **Compact System**
  - Utilizes a single server supporting the following Pinnacle<sup>3</sup> functions:
    - Server processing
    - Compute power
    - Data Storage
- **Ideal for smaller facilities**
  - Designed to support 1-3 concurrent users
- **Versatile access options**
  - 810/810X workstations & Expert Clients
  - Sun Ray thin clients
  - PCs & MACs via Virtual Client Connection (VCC)
  - VCC can also be loaded onto Citrix server for remote access



# Key Features

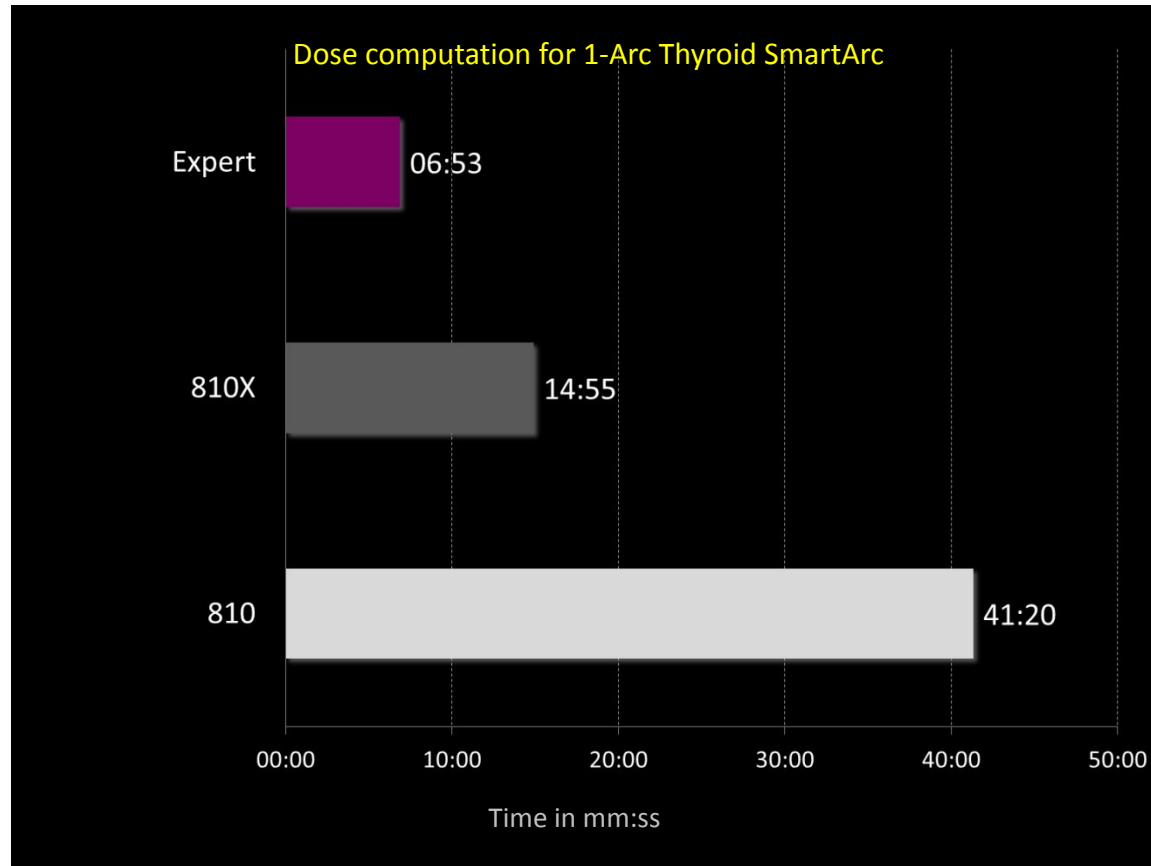
## Delivering high value performance

- **Faster calculations**
  - 2x to 6x faster dose calculations than 810X/810
- **Increased capacity for users and plans**
  - 2x to 4x more RAM than 810X/810
  - 2x to 4x more threads than 810X/810 for faster dose calculations using multi-threading
- **More storage & redundancy**
  - 3.5TB for increased plan data
  - RAID included for increased redundancy
  - Expandable storage with NAS
- **Enhanced remote access**
  - Improved remote access at 90% lower bandwidth with VCC connections (10Mbps)

Expert Server & Client	
CPU	Intel Xeon E3 1275, <b>4-core</b> , 3.5 GHz
Memory	<b>32GB</b>
Storage On Server	<b>3.5 TB</b>
RAID On Server	LSI 4 Port 6GB SAS RAID5 Controller
Power	Single 120/240 VAC
Network	100/1000 Mbps network ports
Media	DVD drive
Access Points	Sun Ray DTU 3+ VCC PC Access Point Kit

# Collapsed Cone Dose Calc Performance

2x – 6x faster than 810X & 810



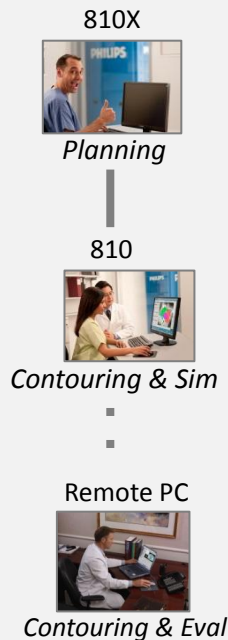
*Calculations performed with Pinnacle<sup>3</sup> 9.8; Dose grid size: 95x89x123; grid resolution:2mm;  
Dose engine: Collapsed Cone Convolution Superposition*

# Pinnacle<sup>3</sup> Expert in the department

Provides a consistent high quality performance for users

## Typical Workstation Environment

Variable performance and availability of applications –  
*affecting* productivity & satisfaction



## Expert Environment

Consistent performance and availability of applications –  
*helping* productivity & satisfaction



\* Concurrent usage licenses apply for some applications



# More information

[www.philips.com/pinnacle-expert](http://www.philips.com/pinnacle-expert)

Products  
Radiation Oncology Systems  
Treatment Planning  
Pinnacle³ Expert

## Pinnacle³ Expert

Details Education Support

Overview Resources



**The power of centralized computing in a compact package**

Designed specifically to meet the needs of the small clinic, Pinnacle³ Expert is an affordable, high-performance system enabling efficient treatment planning from virtually anywhere.

The demand for more efficient treatment planning is increasing. Even the smallest centers are adopting sophisticated treatment techniques to improve patient care and remain competitive. As clinicians become more and more mobile, there is an increased demand for fast and reliable remote access. Pinnacle³ Expert provides an affordable, high-performance solution without the high costs of IT support.

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For more information on Philips radiation oncology systems.

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Pinnacle³ Expert Deployment

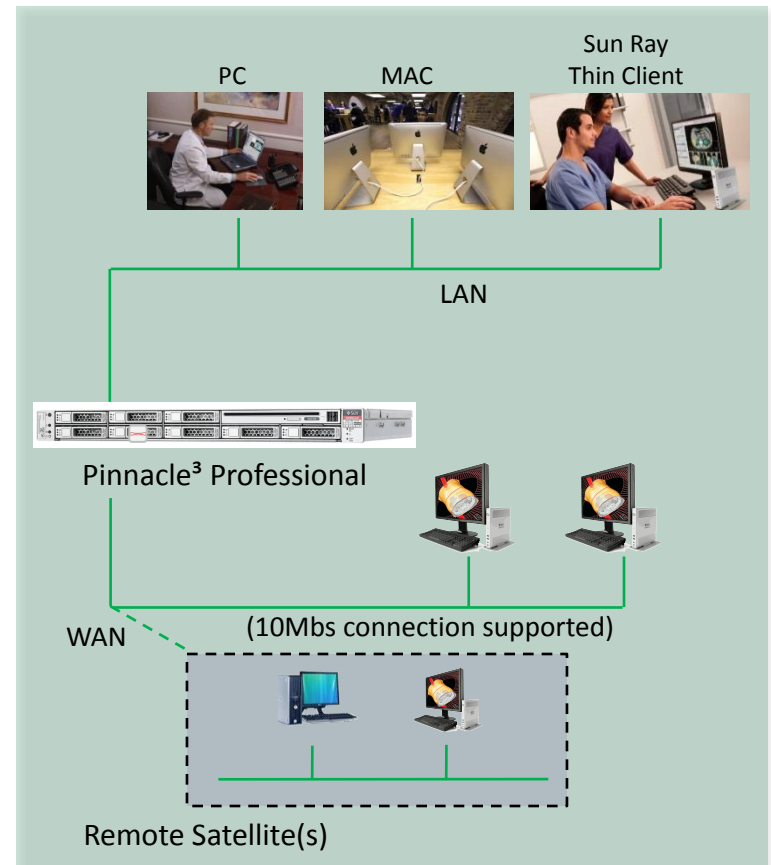
# Pinnacle<sup>3</sup> Professional



# Deployment

Designed to meet the needs of small/mid-sized departments

- **Compact System**
  - Utilizes a single Application server supporting the following Pinnacle<sup>3</sup> functions:
    - Server processing
    - Compute power
    - Data Storage
- **Ideal for mid-sized facilities**
  - Designed to support 3-6 concurrent users
- **Versatile access options**
  - 810/810X workstations
  - Sun Ray thin clients
  - PCs & MACs via Virtual Client Connection (VCC)
  - VCC can also be loaded onto Citrix server for remote access
- **Upgradeable to SmartEnterprise**
  - Professional can become an Application Server in SmartEnterprise



# Key Features

Delivering high performance with low IT requirements

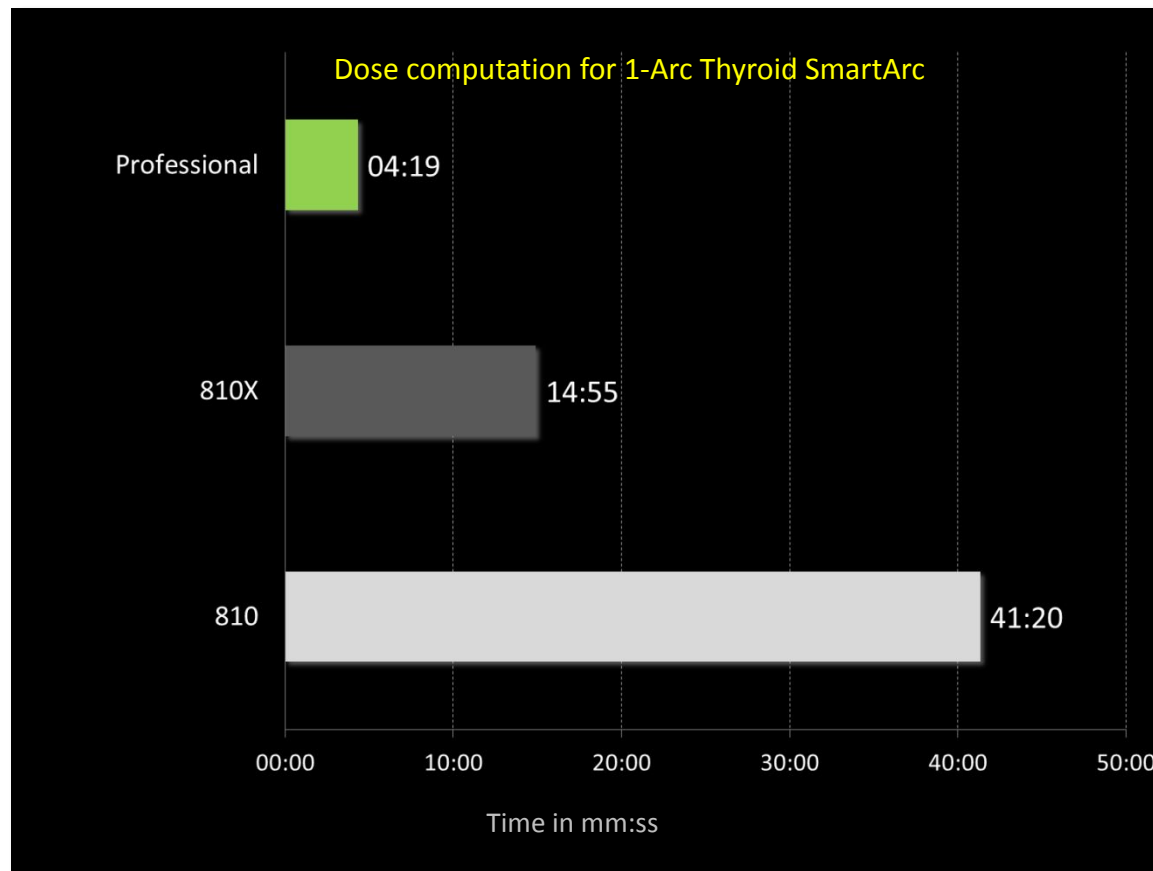
- **Faster calculations**
  - 3x to 9x faster processing than 810X/810
- **Increased capacity for users and plans**
  - 5x, 10x, 20x more RAM than Expert, 810X & 810
  - 4x, 8x, 16x more threads than Expert, 810X & 810 for faster dose calculations using multi-threading
- **More storage & redundancy**
  - 2.3TB for increased plan data
  - Expandable storage with NAS
- **Enhanced remote access**
  - Improved remote access at 90% lower bandwidth with VCC connections (10Mbps)

Professional (X3-2)	
CPU	Intel Xeon E5-2690, <b>2x 8-Core</b> , 2.90 GHz
Memory	<b>160 GB</b>
Storage	2.3 TB
RAID	7x 600GB SAS <b>RAID-5 Controller</b>
Power	<b>Dual, Redundant</b> 120/240 VAC
Network	4x 100 Mbps/1 Gbps/10 Gbps network ports Network-based remote power control & console capability (ILOM)
Media	External DVD drive
Access Points	Sun Ray DTU 3+ VCC PC Access Point Kit



# Collapsed Cone Dose Calc Performance

3x – 9x faster than 810X & 810 workstations



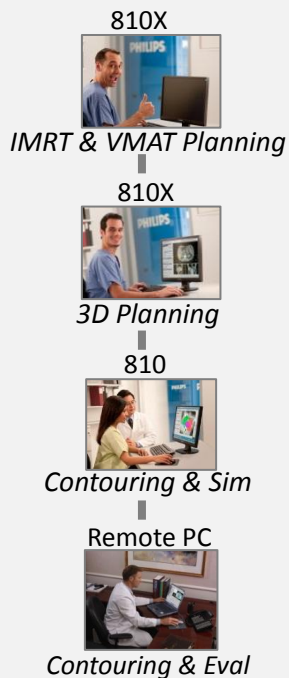
*Calculations performed with Pinnacle<sup>3</sup> 9.8; Dose grid size: 95x89x123; grid resolution:2mm;  
Dose engine: Collapsed Cone Convolution Superposition*

# Pinnacle<sup>3</sup> Professional in the department

Provides a consistent high quality performance for users

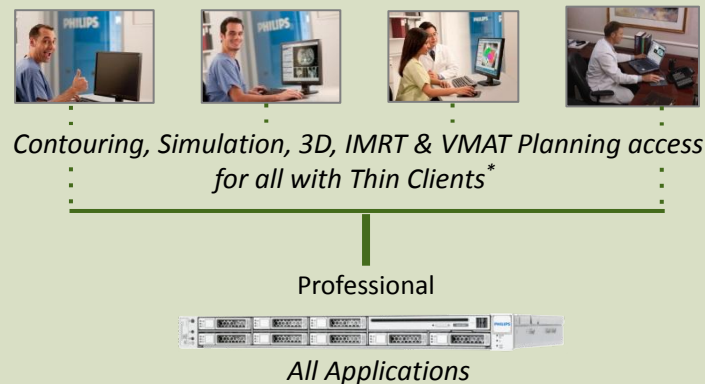
## Typical Workstation Environment

Variable performance and availability of Pinnacle<sup>3</sup> applications – affecting productivity & satisfaction



## Professional Environment

Consistent performance and availability of Pinnacle<sup>3</sup> applications – helping productivity & satisfaction



\* Concurrent usage licenses apply for some applications

# More information

[www.philips.com/pinnacle-professional](http://www.philips.com/pinnacle-professional)

Products & Solutions  
Radiation Oncology Systems  
Treatment Planning

## Pinnacle<sup>3</sup> Professional

Details Education Support

Pinnacle<sup>3</sup> Professional Overview Resources



### The power of centralized computing at your fingertips

Designed for the mid-size center, an affordable, reliable server-class system that provides access from virtually any location, scalable to grow with your needs.

Accuracy, flexibility, and productivity  
Professional is a fast, flexible, and scalable platform to support the Pinnacle<sup>3</sup> application for small to mid-size clinics who have up to three LINACs. The server-based system offers reliability and the scalability to grow with the customer. Centralized processing offers all users the power of the professional server. Running on a Professional platform, Pinnacle<sup>3</sup> facilitates the accuracy, flexibility, and productivity you have come to know from Philips.

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For more information on Philips radiation oncology systems.

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Pinnacle<sup>3</sup> Professional

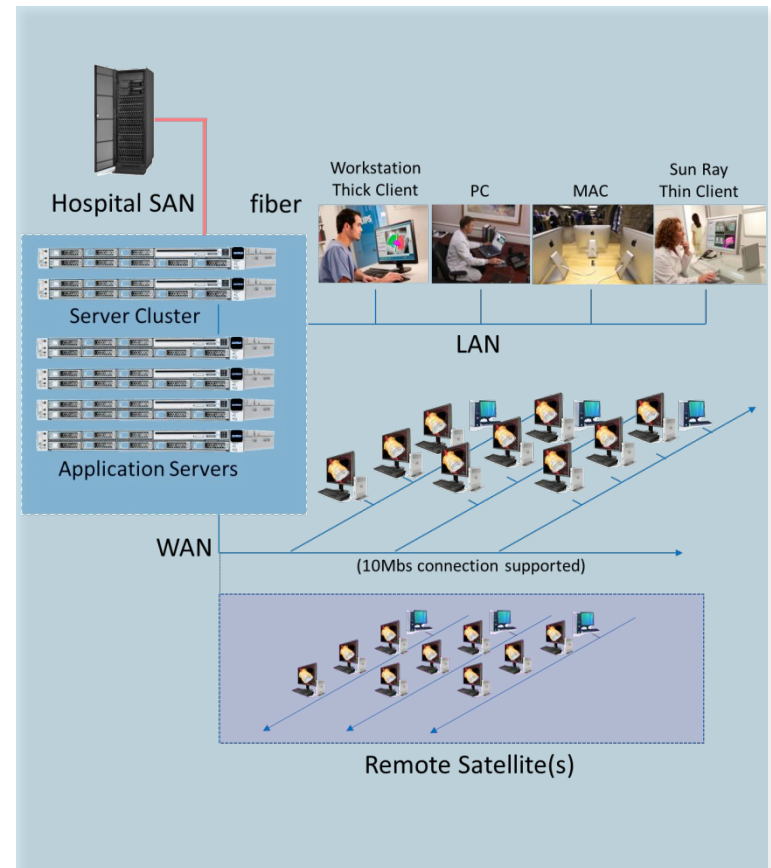
# Pinnacle<sup>3</sup> SmartEnterprise



# Deployment

Designed to meet the needs of large/distributed departments

- **Enterprise System**
  - Increases computation power by utilizing multiple Application Servers for Server processing & compute power
  - Increases redundancy with Server Cluster
- **Ideal for large or distributed facilities**
  - Designed to support large number of concurrent users
- **Versatile access options**
  - 810/810X workstations & Expert Clients
  - Sun Ray thin clients
  - PCs & MACs via Virtual Client Connection (VCC)
  - VCC can also be loaded onto Citrix server for remote access
- **Scalable with high reliability features**
  - Applications Servers can be added to accommodate increased computation demand
  - Uninterrupted access to plan data via automatic failover of the Server Cluster



# Key Features

Provides a unique enterprise-wide solution for treatment planning

- **Faster calculations**
  - 3x to 9x faster processing than 810X/810
- **Increased capacity for users and plans**
  - 5x, 10x, 20x more RAM\* than Expert, 810X & 810
  - 4x, 8x, 18x more threads\* than Expert, 810X & 810 for faster dose calculations using multi-threading

*\*for each X3-2 Applications Server. Total RAM for the system will depend on number of Apps Servers connected.*

- **Versatile storage options & redundancy**
  - Storage via fiber-connected SAN\*
  - Multiple Application Servers balance the computation across the access points and accommodate increasing demands.

*\*must be validated as part of the Oracle Solaris Cluster Storage Partner Program*

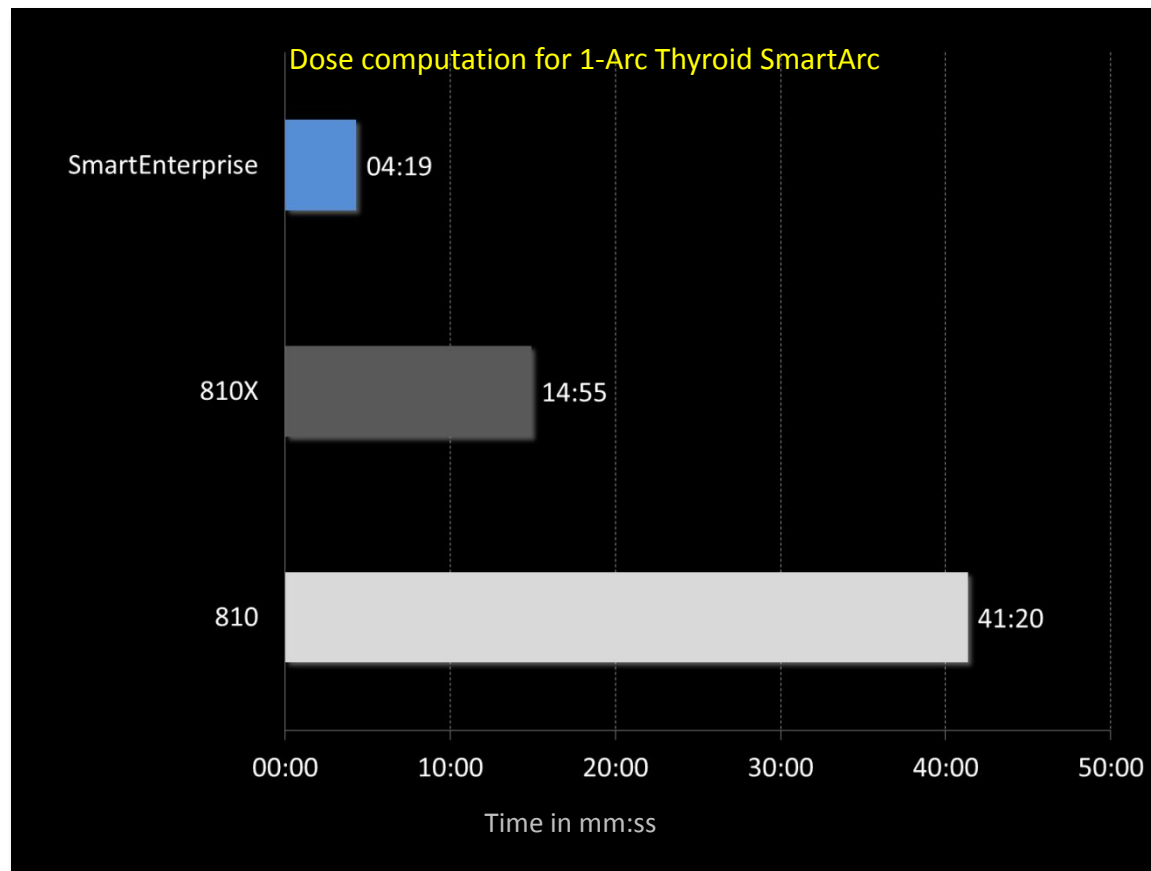
- **Enhanced remote access**
  - Improved remote access at 90% lower bandwidth with VCC connections (10Mbps)

SmartEnterprise (X3-2)	
CPU	Multiple Intel Xeon E5-2690, 2x 8-Core, 2.90 GHz
Memory	160 GB
Storage	Utilizes SAN storage
Power	Dual, redundant 120/240 VAC
Network	4x 100 Mbps/1 Gbps/10 Gbps network ports Network-based remote power control & console capability (ILOM)
Media	External DVD drive
Access Points	Sun Ray DTU 3+ VCC PC Access Point Kit

*Specs for each Application Server*

# Collapsed Cone Dose Calc Performance

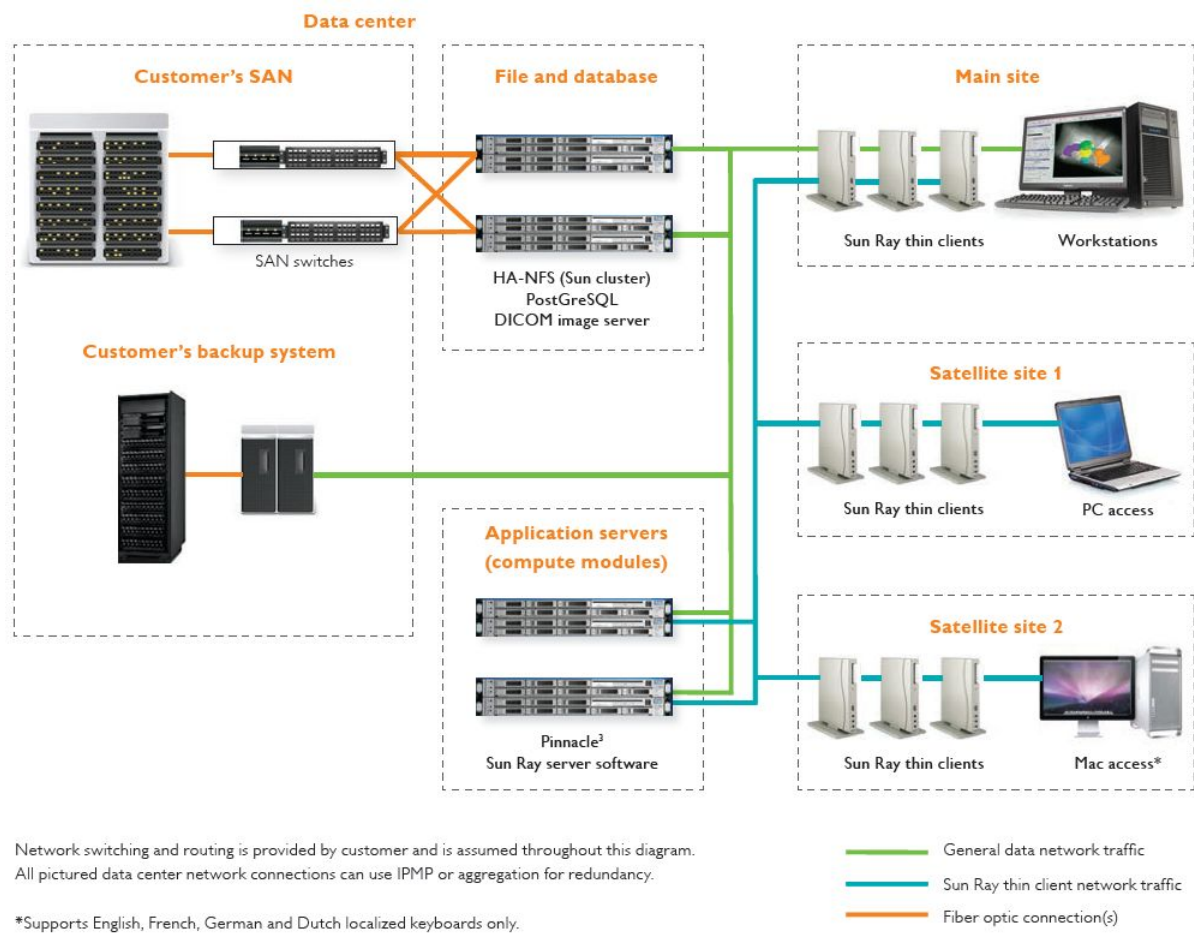
3x – 9x faster than 810X & 810 workstations



*Calculations performed with Pinnacle<sup>3</sup> 9.8; Dose grid size: 95x89x123; grid resolution: 2mm;  
Dose engine: Collapsed Cone Convolution Superposition*

# Networking

## Potential to interface with hospital IT infrastructure





# SmartEnterprise in distributed departments

## Implementation at Cancer Partners, UK

- SmartEnterprise server located in Centralized data center near London
- Disaster recovery data center ~ 60 miles (100Km) away
- 7 treatment centers
- Common treatment planning & OIS; different LINACs and Imaging devices
- Clinics use thin clients only
- MDs, Physicists & planner use existing PC & MACs from home with Virtual Client Connection (VCC)



# SmartEnterprise in distributed departments

## Implementation at US Oncology Network Dallas POD 2014

- SmartEnterprise server located in centralized 3<sup>rd</sup> party data center northeast of Dallas
- Data center serves sites up to ~ 70 miles (100Km) away
- 5 treatment centers
- Common treatment planning & OIS; different LINACs and Imaging devices
- Mix of Thin client and Virtual Client Connection at Clinics
- Sherman site provides laptop with VCC to lone planner, allowing planning when offsite.



# Select SmartEnterprise installations

High adoption rate in large centers worldwide

Royal Adelaide Hospital	Adelaide	Australia
Liverpool Hospital	Liverpool	Australia
Princess Margaret Hospital	Toronto	Canada
Sunnybrook Health Sciences	Toronto	Canada
China Academy of Medical Sciences	Beijing	China
Shanghai Tumor Hospital	Shanghai	China
Odense University Hospital	Odense	Denmark
University of Erlangen	Erlangen	Germany
Netherlands Cancer Institute (NKI)	Amsterdam	Netherlands
University Medical Center Nijmegen	Nijmegen	Netherlands
Christie Hospital	Manchester	UK
Royal Marsden Hospital	London	UK

MD Anderson	Houston	TX
University of Texas Southwestern	Dallas	TX
William Beaumont Hospital	Royal Oak	MI
University of Wisconsin Hospital	Madison	WI
University of Chicago	Chicago	IL
Cleveland Clinic Health Systems	Cleveland	OH
New York Presbyterian Hospital	New York	NY
New York Oncology Hematology	Clifton Park	NY
University of Florida	Jacksonville	FL
Johns Hopkins Health System	Baltimore	MD
Oregon Health Sciences Univ	Portland	OR
Swedish Medical Center	Seattle	WA

# More information

[www.philips.com/pinnacle-smarterprise](http://www.philips.com/pinnacle-smarterprise)

The screenshot shows the Philips Pinnacle<sup>3</sup> SmartEnterprise website. On the left is a navigation menu with 'Products & Solutions', 'Radiation Oncology Systems', and 'Treatment Planning'. The main header features the 'SmartEnterprise' logo and tabs for 'Details', 'Education', and 'Support'. Below the header, there are sub-tabs for 'Overview' and 'Resources'. A central image shows two healthcare professionals, an older woman and a younger woman, looking at a laptop displaying medical scans. To the right of the image is a headline: 'Philips Pinnacle<sup>3</sup> SmartEnterprise: Undeniably smart, unbelievably efficient'. Below this is a sub-headline 'Compact yet powerful' and a paragraph describing the 'thin client' technology. To the right of the text are social sharing options (Email, SHARE, Facebook, Twitter, etc.) and a 'Request more info' button. At the bottom right, there is a 'Related Products' section listing 'AcQSim<sup>3</sup>', 'CT Big Bore', and 'Model Based Segmentation'.

Products & Solutions  
Radiation Oncology Systems  
Treatment Planning  
SmartEnterprise

## SmartEnterprise

Details Education Support

Overview Resources



### Philips Pinnacle<sup>3</sup> SmartEnterprise: Undeniably smart, unbelievably efficient

**Compact yet powerful**  
The Pinnacle<sup>3</sup> SmartEnterprise configuration leverages "thin client" technology to centralize your Pinnacle<sup>3</sup> radiation therapy planning system and give you exceptional flexibility. All computing power and data storage is moved from the desktop into your data center, enhancing accessibility, maintenance, and management of the system and making remote access easy.

The Pinnacle<sup>3</sup> application is displayed on cost-effective and space-efficient thin client desktop devices.

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For more information on Philips radiation oncology systems.

Request more info

Related Products

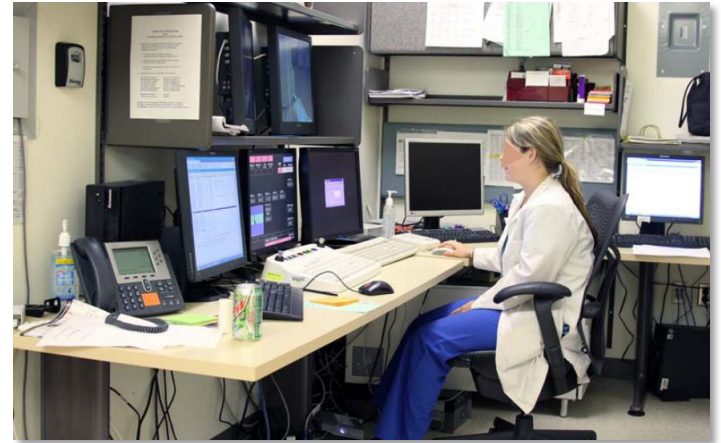
- + AcQSim<sup>3</sup>
- + CT Big Bore
- + Model Based Segmentation

# Other considerations

# Thin Clients & Citrix

## Simplifying workflow and enhancing access

- **Simplifying workflow**
  - The hardware & software thin clients enable access to the OIS systems reducing the need for multiple terminals or monitors for planning and record & verify systems
- **Enhancing access**
  - Virtual Client Connection (VCC) software can be loaded onto the Citrix server to enable remote access



# Backup & Disaster Recovery

To be provided by the institution

- Backup Agent for disaster recovery
  - Any backup agents with Solaris 10 support for x86
  - Loaded on Expert, Professional and SmartEnterprise
- Disaster Recovery storage system
  - Data protection is the responsibility of the center
  - Site's existing enterprise backup system or Network Area Storage via NFS are supported
  - Supported backup agents:
    - EMC Legato Networker
    - HP Data Protector
    - IBM Tivoli Storage Manager
    - Symantec Veritas Backup Exec
    - Symantec Veritas NetBackup
    - Bakbone Netvault



# Pinnacle<sup>3</sup> Platforms

The right system to meet your planning needs

Functionality	Expert	Professional	SmartEnterprise
<b>Performance</b>			
Speed of computation	✓	✓ ✓	✓ ✓
Number of concurrent users supported	✓	✓ ✓	✓ ✓ ✓
Built-in RAID	✓	✓	
Storage via SAN			✓
System redundancies to reduce disruptions	✓	✓ ✓	✓ ✓ ✓
<b>Access</b>			
Number of access points & devices supported	✓	✓	✓
Ability for direct/Citrix-based remote access	✓	✓	✓
Support for low bandwidth connections	✓	✓	✓
<b>Investment</b>			
Scalability of system to grow with dept.'s needs	✓	✓ ✓	✓ ✓ ✓





# Appendix:

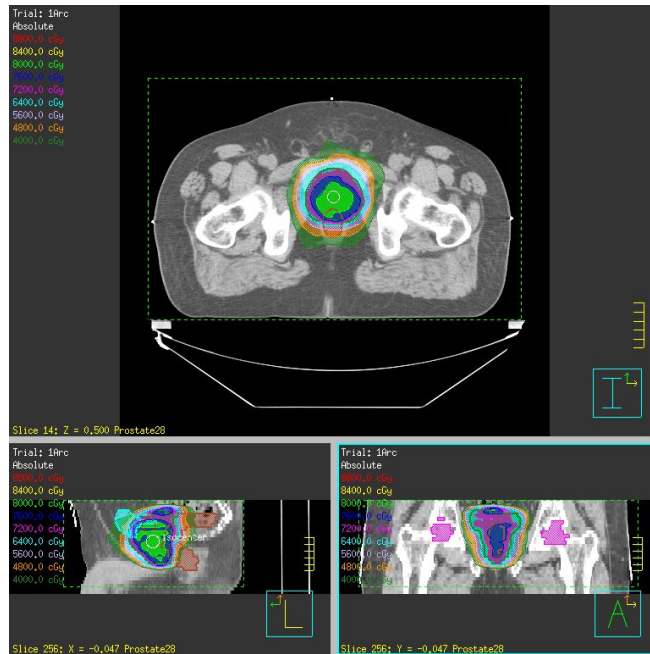
Speed tests

Platforms comparison table explained

Alternative endings

# Collapsed Cone Dose Calc Performance

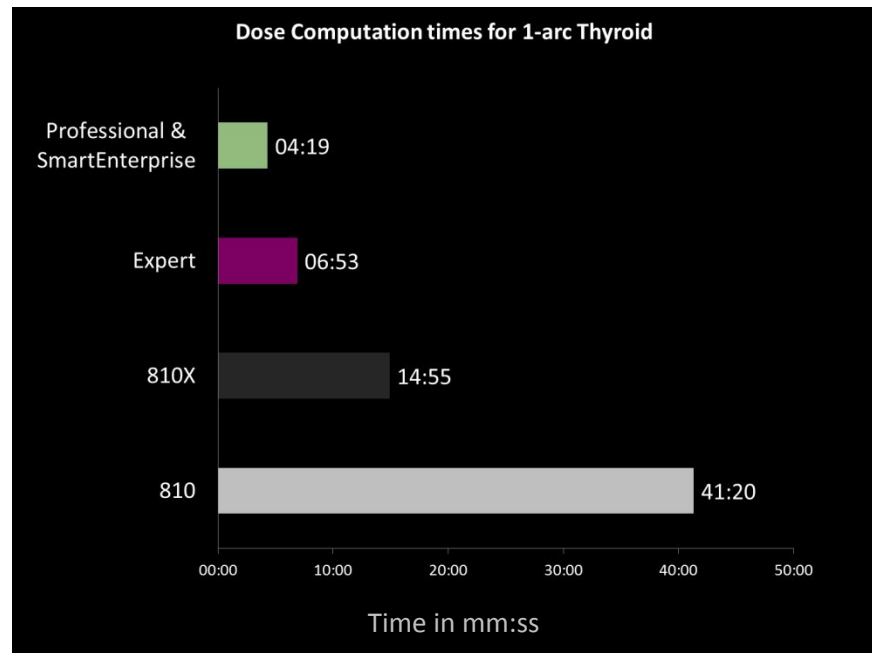
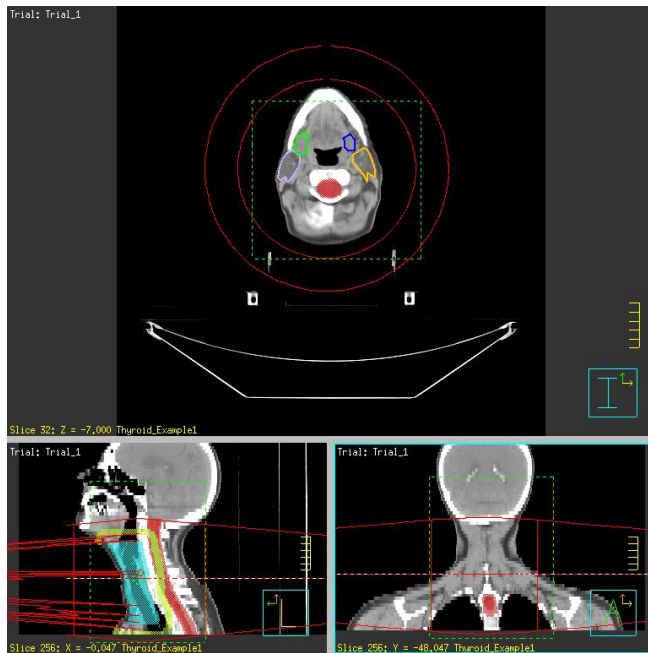
## 1-Arc Prostate with 90 Control Points



Calculated with Pinnacle<sup>3</sup> 9.8; grid resolution: 2mm; dose engine: Collapsed Cone  
Control Points: 90; grid size: 209x135x65

# Collapsed Cone Dose Calc Performance

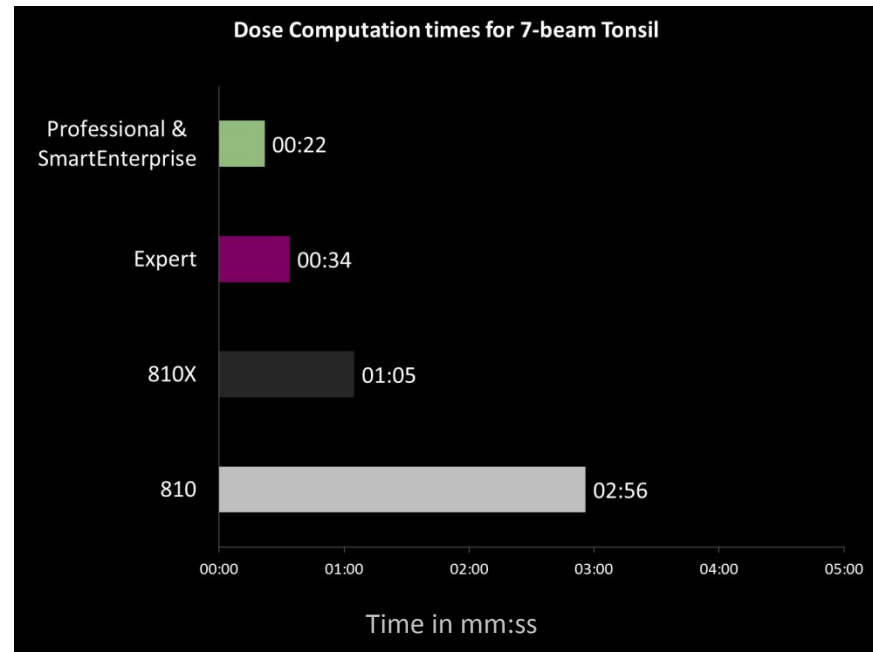
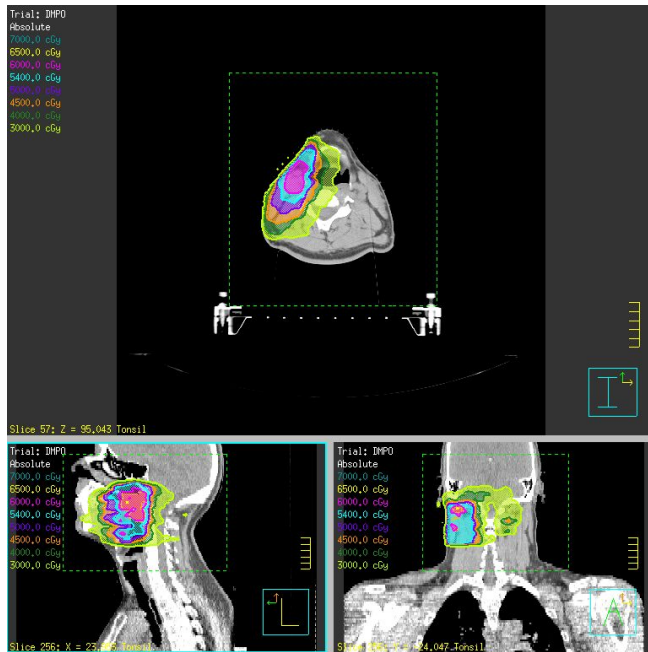
## 1-Arc Thyroid with 90 Control Points



Calculated with Pinnacle<sup>3</sup> 9.8; grid resolution: 2mm; dose engine: Collapsed Cone  
Control Points: 90; grid size: 95x89x123

# Collapsed Cone Dose Calc Performance

## 7-Beam Tonsil IMRT/DMPO with 56 Segments



Calculated with Pinnacle<sup>3</sup> 9.8; grid resolution: 2mm; dose engine: Collapsed Cone  
Segments: 56; grid size: 117x131x93

# Pinnacle<sup>3</sup> Platforms

The right system to meet your planning needs

Functionality	Expert	Professional	SmartEnterprise
---------------	--------	--------------	-----------------

## Performance

Speed of computation	<i>2x – 6x faster</i>	<i>3x – 9x faster</i>	
Number of concurrent users supported	<i>1 – 3</i>	<i>3 – 6</i>	<i>&gt;6</i>
Built-in RAID	<i>3.5TB</i>	<i>2.3TB</i>	<i>-</i>
Storage via SAN	<i>-</i>	<i>-</i>	<i>Fiber channel required</i>
System redundancies to reduce disruptions	<i>Built-in RAID Connection to NAS</i>	<i>ILOM Dual Power supply Built-in RAID Connection to NAS</i>	<i>ILOM Server Cluster Multiple Apps Servers Multi-path connection to SAN</i>

## Access

Number of access points & devices supported	<i>Virtually unlimited numbers can be connected.</i>
Ability for direct/Citrix-based remote access	<i>All via VCC</i>
Support for low bandwidth connections	<i>All via VCC (10Mbps vs 100Mbps)</i>

## Investment

Scalability of system to grow with dept.'s needs	<i>Add Expert Client</i>	<i>Upgrade to SE</i>	<i>Add App Server(s)</i>
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# Pinnacle<sup>3</sup> Expert

The right system to meeting your planning needs

Faster treatment planning

Improved access

Reduced operational costs



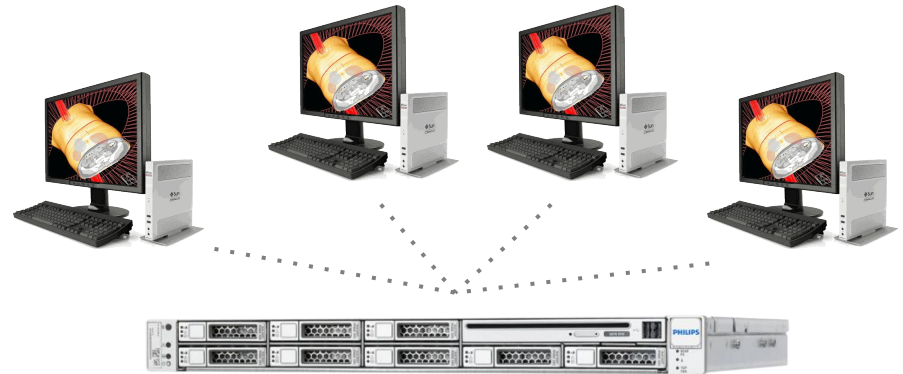
# Pinnacle<sup>3</sup> Professional

The right system to meeting your planning needs

Faster treatment planning

Improved access

Reduced operational costs





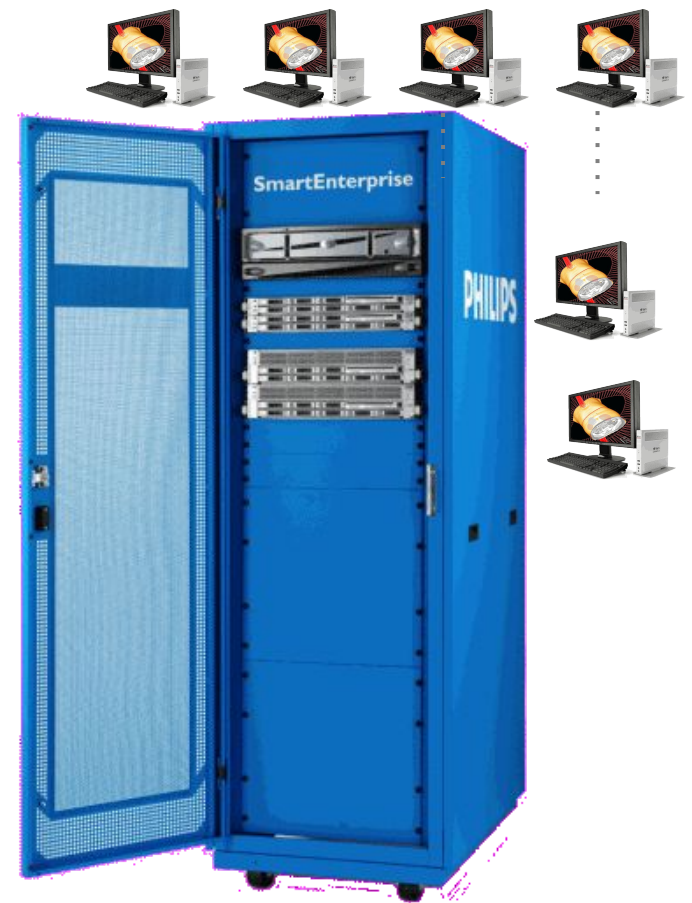
# Pinnacle<sup>3</sup> SmartEnterprise

The right system to meeting your planning needs

Faster treatment planning

Improved access

Reduced operational costs



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