

CENDIO®

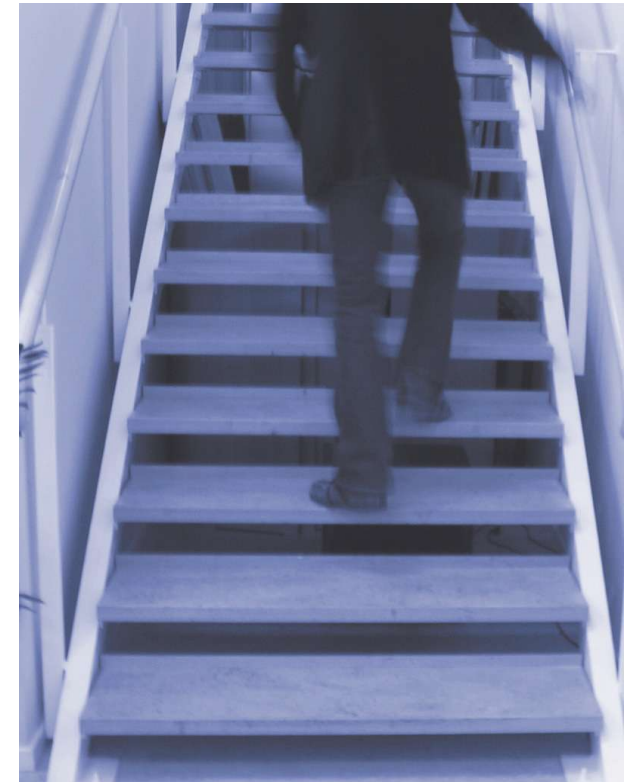


Using ThinLinc in a HPC environment part 2: ThinLinc details

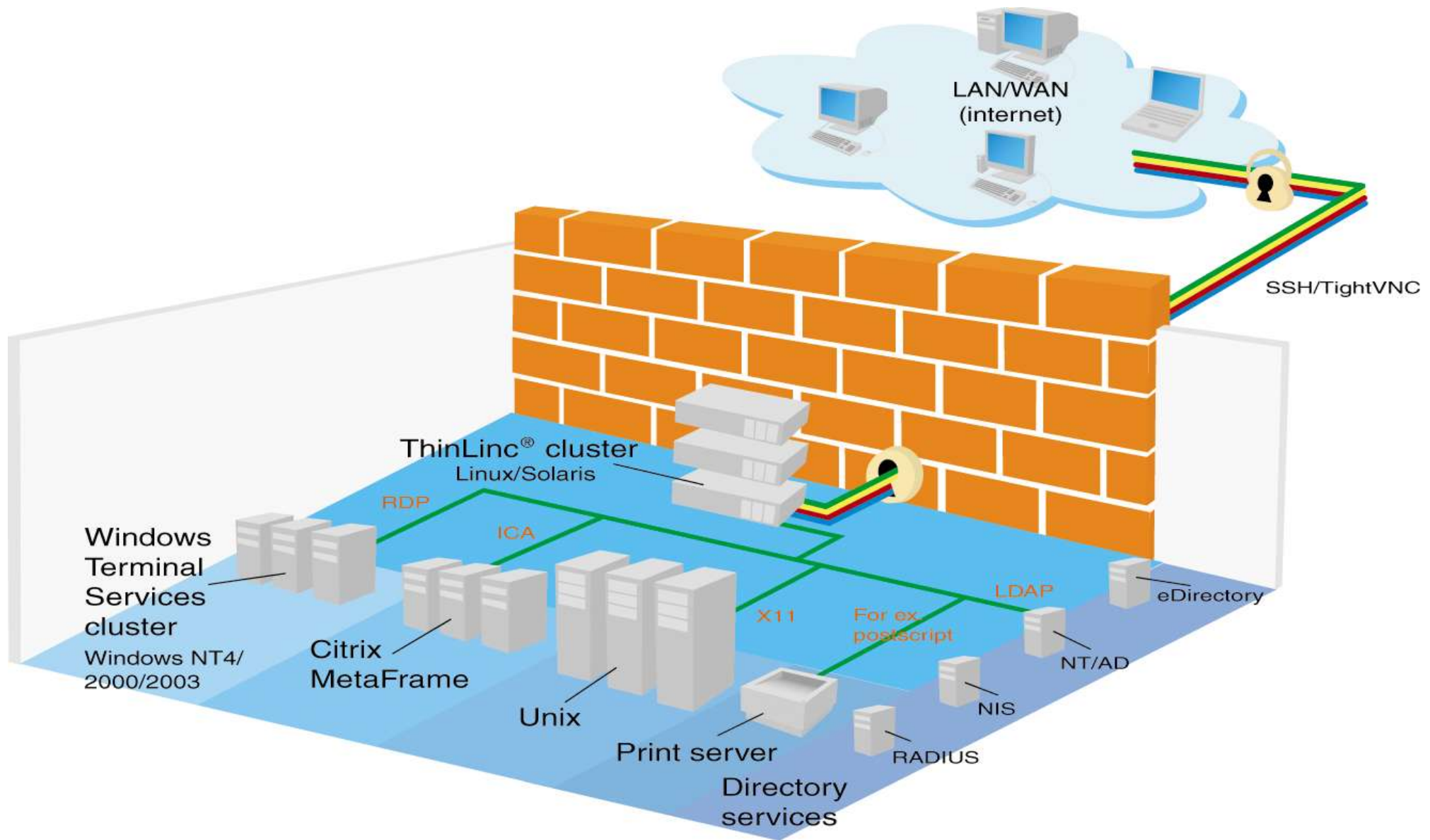
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A Little About Cendio

- Cendio develops and markets **ThinLinc**[®], a flexible and secure solution for Server-Based Computing.
- Develops products and service based on Open Source Software and Linux.
- Previously active in embedded systems with customers such as Ericsson, Electrolux, Nokia and Kreatel.
- The worlds oldest open source company (as far as we know).



ThinLinc System Architecture



Some ThinLinc Properties

- Server works on Linux and Solaris
- Clients work on Linux, Solaris, Windows and more
- Designed to work in a heterogeneous environment
 - Authentication against NIS, AD, eDirectory, Radius, OTP
 - File servers: NFS, CIFS, Novell, ...
- Can mix applications from different OS:es on the same desktop
 - Windows, Unix, Terminal based (7270, 45xx)
 - Supports cut&paste between all applications
- Single SignOn included in the basic solution

More ThinLinc Properties

- Supports two different printer concepts
 - Local printer
 - Nearest Printer
- Can give server based programs access to local resources
 - Printer
 - Storage (disk, CDROM, floppy, USB stick, digital cameras, etc.)
 - Serial ports
- Security is built in everywhere
 - Encryption, authentication, compartmentalization

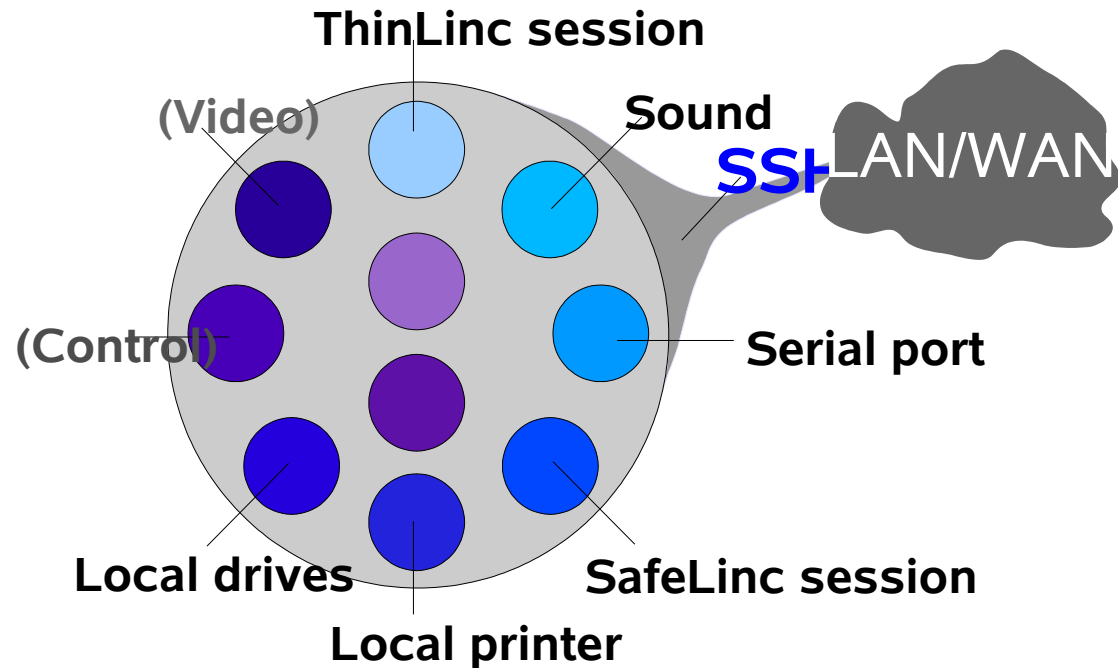
Even More ThinLinc Properties

- Load Balancing
 - ThinLinc load balances in real time
 - If Windows Terminal Server is used, the load balancing is done in two levels: in the ThinLinc servers and the Windows servers
 - Can handle all WTS versions from NT 4 to Windows 2003 in the same cluster
 - The system controls performance on all machines at every login and logout
- High Availability Clustering (HA)
 - Used to create higher availability
 - “Live” machines are used so there is no redundant hardware.
 - Support for Solaris and Linux
 - No extra kernel modules.

ThinLinc Security

The Communication Model

- SSH – Secure Shell is used to provide IP tunnelling
- All communication is done through the SSH tunnel in separate channels
 - One tunnel per service
 - Only one port needs to be open in the firewall
 - Possible to do Quality of Service
- Possible to use 3rd party plugins through the tunnel



ThinLinc Security

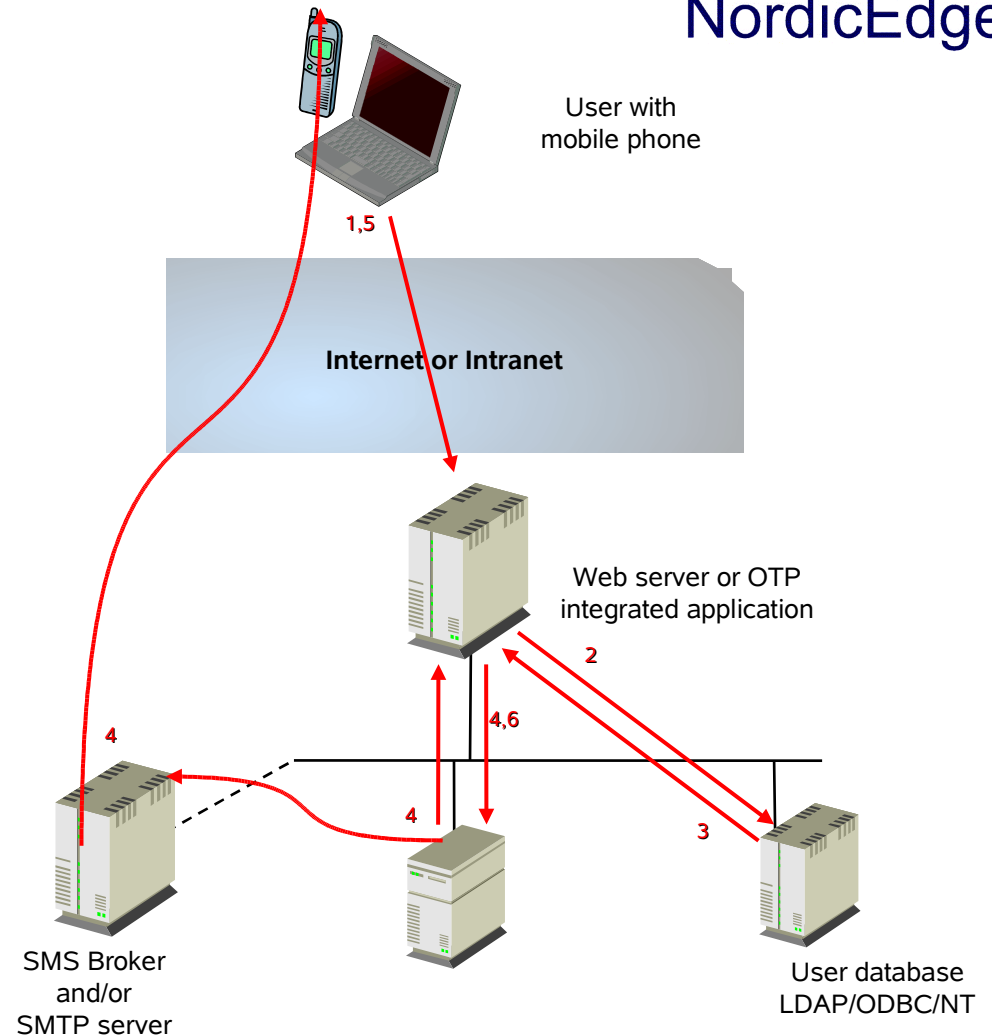
Channel Encryption

- Secure Shell (ssh) Protocol v.2
 - Secure algorithm
 - Two factor authentication
 - Digital signatures to avoid “Man in the middle attacks”
 - RSA public key algorithms
 - No communication is done unencrypted
 - Strong Encryption
 - US standard AES, 3 DES
 - Up to 256 bit key length
 - Data integrity with Hash Message Authentication Codes, HMAC
 - Open SSH, the most used UNIX implementation, is used in ThinLinc
 - De facto standard for remote access to UNIX machines
 - Putty, the most used Windows-implentation, is used ThinLinc
 - The source code is available for control

NordicEdge OTP - integration

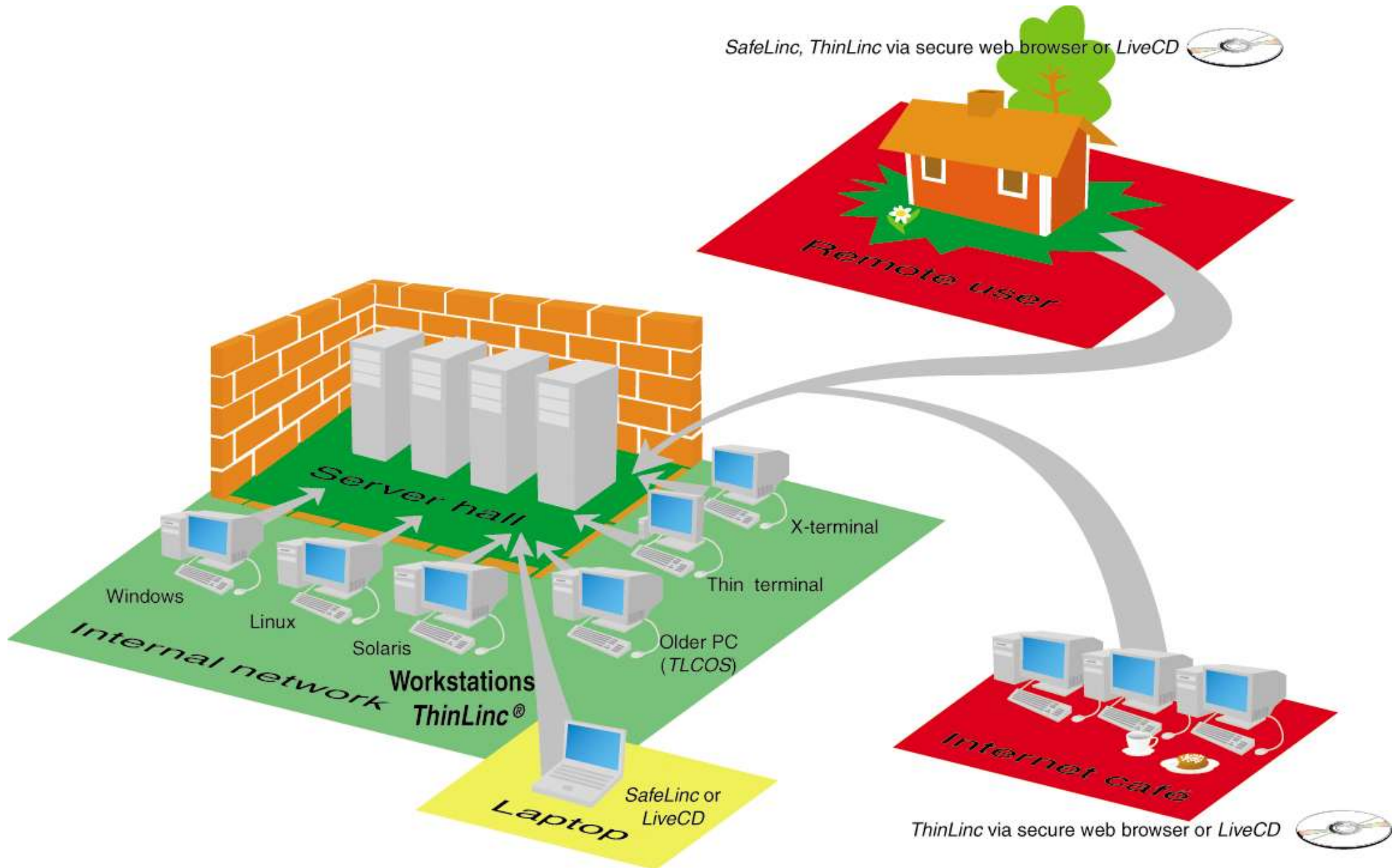
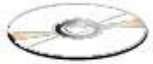


1. The user logs into the application
2. Username/password is verified in the database
3. If username/password is correct, the mobile number is retrieved from the user object
4. NordicEdge OTP server generates a one time password and sends it to the users mobile phone via SMS
5. The user enters the one time password
6. NordicEdge OTP server verifies the one time password and if it is correct, the user gets access to the application



Working Securely From Home

SafeLinc, ThinLinc via secure web browser or LiveCD



Working From Home

The good and the bad

- Big gains possible by allowing telecommuting
 - No need to come to work to fix emergencies during evenings
 - Better balance between work and off time
 - Is considered “modern” by the staff
- However: Home computers form an *extreme* security risk
 - Many relatively new users of the network
 - Often anti virus or firewall completely missing
 - Spyware and Trojans are very common
 - Pirated software very common

Bandwidth Use

- ThinLinc minimizes bandwidth use in many ways:
 - Only sends differences in the screen contents
 - Only sends latest version of the screen
 - Smart compression algorithms
 - Adaptive choice of compression algorithm depending on bandwidth / latency
- Also non-graphics are optimized:
 - Print jobs are sent as PDF: ~50% saved
- Minimum bandwidth for an enjoyable *full* session: ~50 kbps

Bandwidth Use (2)

- Future versions will include Quality of Service
 - Reserve x kbps for sound (for instance)
 - No more than y kbps for print jobs
 - (Already possible through the Linux firewall, though not in the product)
- Likely that there will be multimedia optimizations for ThinLinc
 - Send video in separate channel, let the client unpack it.

Demo!

Now follows a live demo of ThinLinc