



PERT OPERATIONS

COURSE OBJECTIVES

By the end of this course you will be able to:

- Describe the methodologies used to investigate performance issues.
- Use a variety of tools to investigate performance issues.

You will also be able to describe the federated structure of the PERT and will know how to become accredited.

COURSE OUTLINE

Module 1 – Overview: History and Structure of the PERT.

Module 2 – Network Performance and User Expectations.

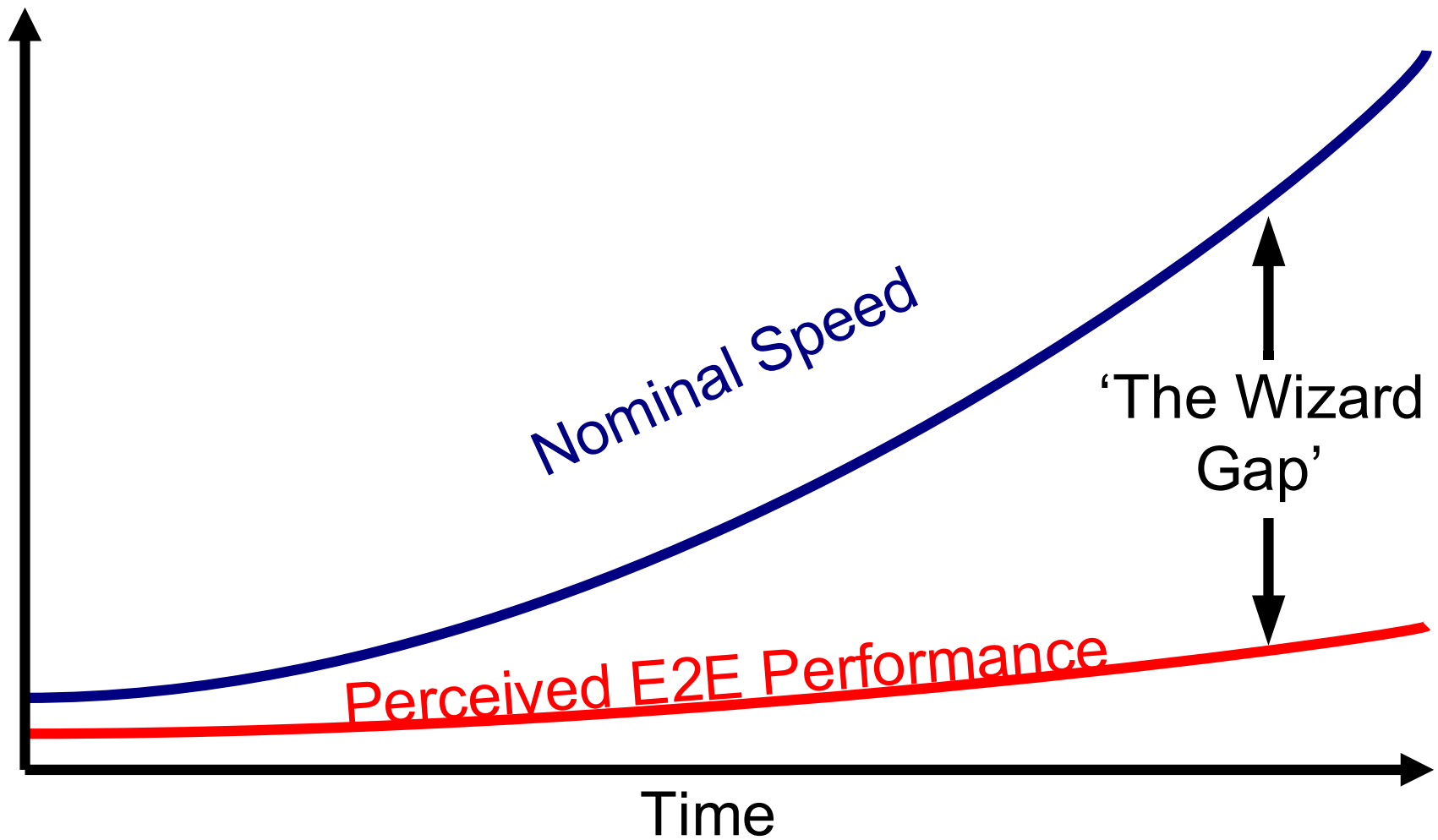
Module 3 – Bulk Transfers Under TCP.

Module 4 – Investigative Tools.

Module 5 – The Methodology of Performance Issue Investigation.

Module 1: Overview: History and Structure of the PERT.

PERT MOTIVATION AND BACKGROUND (1)



PERT MOTIVATION AND BACKGROUND (2)

1990s – internet experiences growing pains.

- Congestion masks other performance problems.
- Network capacity limited application speed.

2000s – Research networks' capacity increase dramatically.

- Other bottlenecks discovered:
 - E.g. campus infrastructure, host limitations, round trip times.
- The 'Wizard gap'.

PERT MOTIVATION AND BACKGROUND (3)

Now: research networking community focused on improving End-to-End performance:

- Measurement activities (such as perfSONAR).
- Transport improvements.
- Internet2's performance workshops.
- The Performance Enhancement and Response Team (PERT).

ORIGINS OF THE PERT

Concept invented during brainstorm between Internet2 and European NRENs.

- Support structure for end-to-end performance issues.
- Equivalent to Computer Emergency Response Team (CERT):
 - Both span multiple domains.
 - No one organisation owns either problem.

WHAT DOES A PERT DO? (1)

Help network users obtain optimal performance by **reactively**:

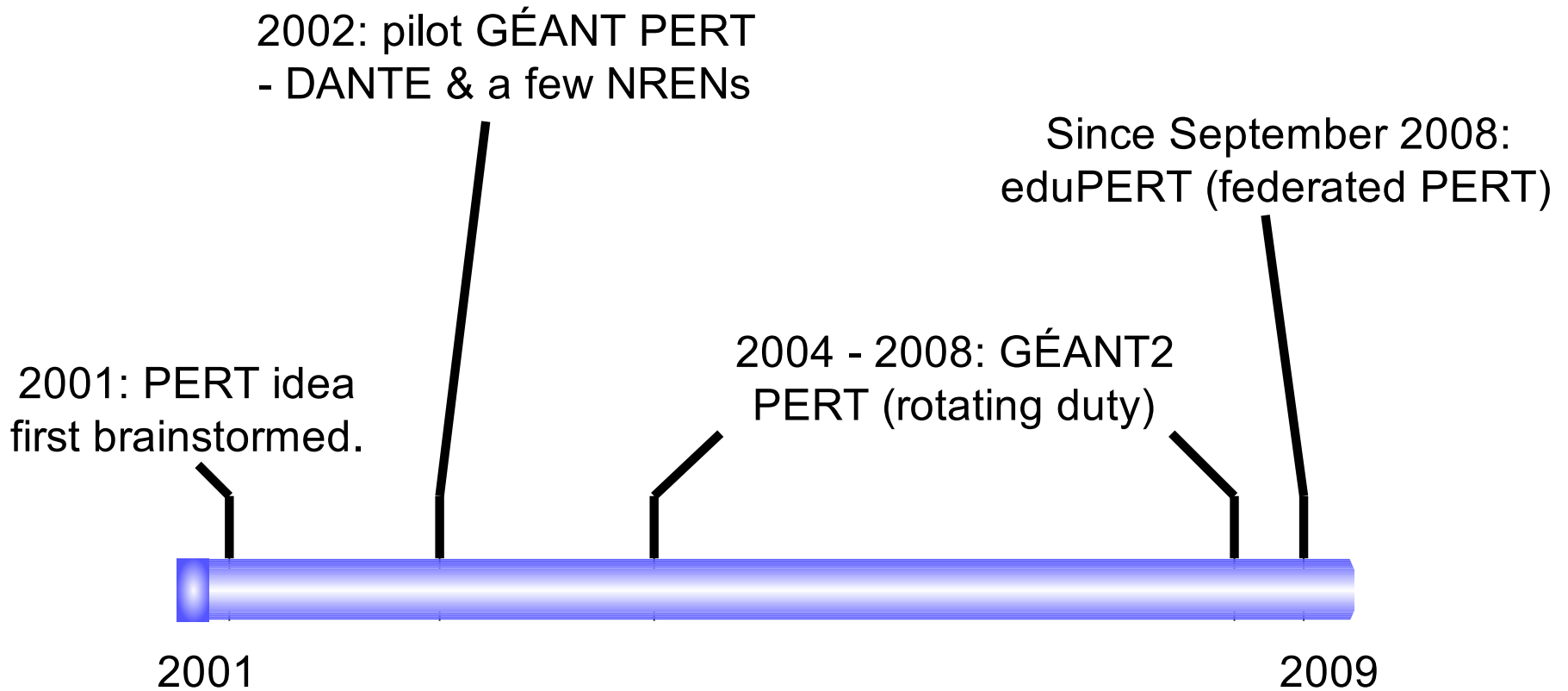
- Accepting problem requests.
- Coordinating measurements.
- Establishing contacts with other teams.
- Locating bottlenecks.
- Suggesting improvements.

WHAT DOES A PERT DO? (2)

Help network users obtain optimal performance by **proactively**:

- Consulting.
- Documenting.
- Measuring.

TIMELINE



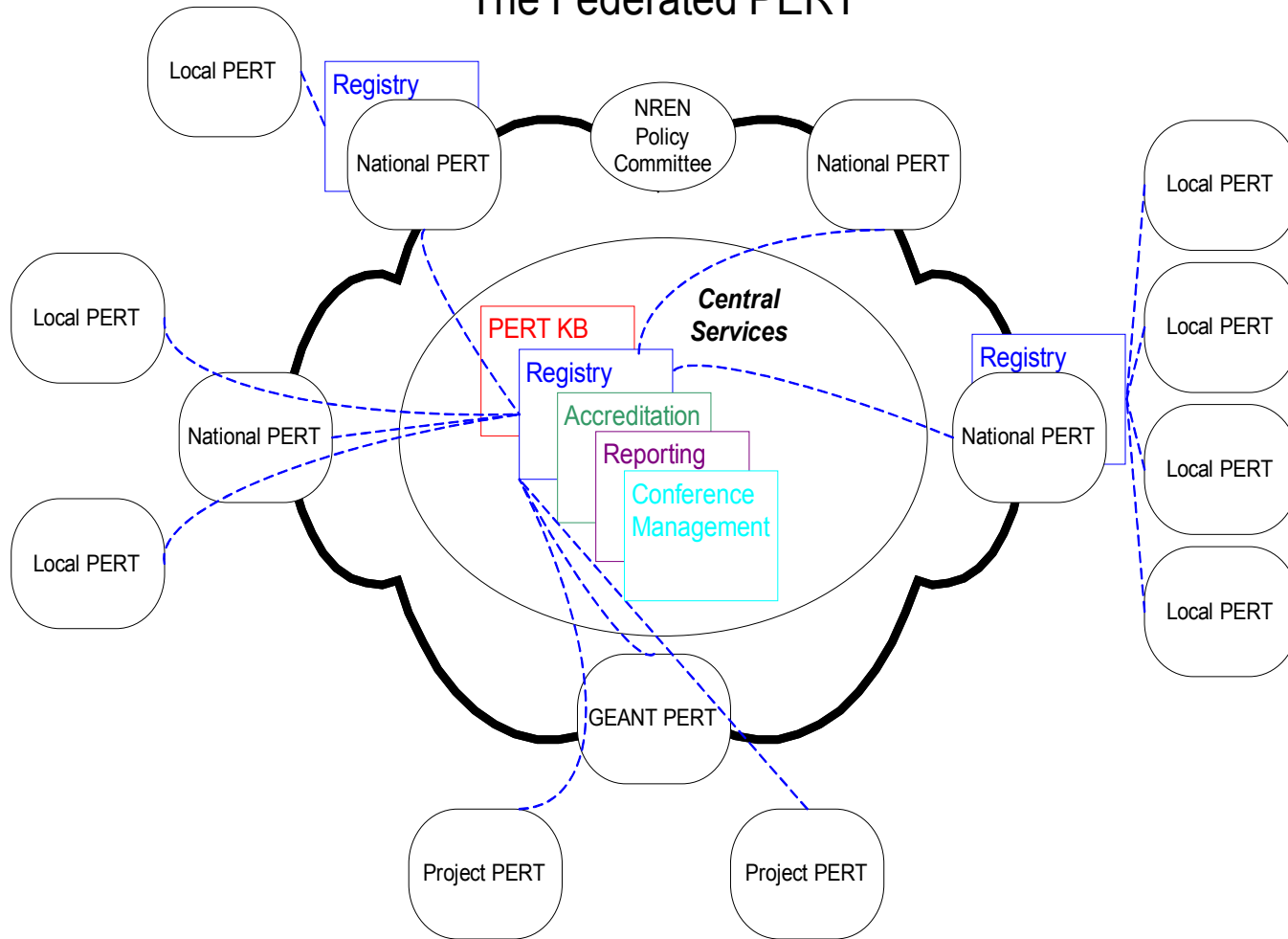
Ensemble of distributed PERTs (NREN, campus, large projects, GÉANT...).

Common coordination functions:

- PERT registration and accreditation .
- Forums for knowledge exchange:
 - PERT Knowledge Base (Wiki) .
 - Workshops and training events.

PERT INTERCONNECTION

The Federated PERT



PERT CENTRAL SERVICES

PERT central services consist of:

- PERT registration.
- PERT accreditation.
- PERT Knowledge base.
- Training / workshops.

PERT REGISTRATION

No formal entry requirements.

Data needed:

- Organisation, PERT name, languages spoken.
- Contacts: manager, public and private entry points.

To register, mail pert-registration@geant2.net or contact your closest upstream PERT.

DANTE maintains PERT register at <http://edupert.geant2.net/>.

PERT ACCREDITATION

An accredited PERT commits to a service level.

- Additional information requested:
 - Hours of service.
 - Response times.
 - Service areas (AS, etc.).
 - Technical network information.
 - Measurement tools that will be shared within eduPERT community generally.
- For accreditation, please contact pert-accreditation@geant2.net.

PERT REPORTING

Reporting is:

- Mandatory for accredited PERTs.
- Encouraged for all PERTs.
- Monthly:
 - Covers no. of new, closed and ongoing cases.
- Summarised by DANTE and included in GN2 Monthly Service Report (MSR).
- Also monthly reporting about usage of PERT Knowledge Base.

PERT KNOWLEDGE BASE (1)

The screenshot shows a Mozilla Firefox browser window displaying the PERT Knowledge Base website. The browser title is "WebHome < PERTKB < TWiki - Mozilla Firefox". The address bar shows the URL "http://kb.pert.geant2.net/PERTKB/WebHome". The page content includes a GEANT2 logo, a navigation menu, and a main text area with a welcome message and a table of contents.

PERTKB

PERTKB Web
Home
Changes
Topics
Index
Search

Welcome
Register

You are here: [TWiki](#) > [PERTKB Web](#) > [WebHome](#)

Welcome to the home of **TWiki.PERTKB**. This is a web-based collaboration area for collecting the knowledge base of the [eduPERT](#).

Much of the material here was published in August 2006 as [GN2-06-135v2 \(DS3.3.3\): PERT Performance Guides](#).

[eduPERT Training Event in Zurich on 27/28 November 2008](#)

See [PERT Training \(2007\)](#) for information about last year's event, including audio/video recordings. [Register here](#) for this year's edition.

[Latest News](#)

Note that you can subscribe to update notifications to this Knowledge Base through an [RSS Feed](#)

[Table of Contents](#)

- [Performance basics: How to report a performance problem, user-perceived performance \(responsiveness, throughput, reliability\), Why latency is important, the "Wizard Gap"](#)
- [Network performance metrics: OWD, RTT \(bandwidth*delay product and "Long Fat Networks" \(LFNs\)\), delay variation \(Jitter\), loss, reordering, MTU/Path MTU](#)
- [Network protocols](#)
 - [Transmission Control Protocol \(TCP\) - terminology](#)
 - [Window-based transmission, performance enhancements - Large TCP windows, buffer auto-tuning, Window Scaling option](#)
 - [Flow control and congestion avoidance, high-speed TCP variants and land speed records, Selective acknowledgements \(SACK\)](#)
 - [User Datagram Protocol \(UDP\)](#)
 - [Real-time Transport Protocol \(RTP\)](#)
 - [Stream Control Transmission Protocol \(SCTP\)](#)

<http://kb.pert.geant2.net/>

PERT KNOWLEDGE BASE (2)

Wiki-powered website.

You must register to edit content.

Wide range of topics:

- General performance concepts.
- Configuration guidance for hosts (various OS) and networks.
- Descriptions of measurement tools with examples.

More participation required from external experts (you).

TRAINING AND WORKSHOPS

Training events, such as this one.

Workshops for inter-PERT exchange of experience and best practice:

- Usually run during GN2 technical workshops.
- Are you interested in having these events in other contexts, or on their own?

COOPERATION BETWEEN PERTS

PERTs need to communicate about issues:

- Offer help to one another when necessary.

Issue ownership can transfer if appropriate.

PERT ROLES AND RESPONSIBILITIES (1)

At a minimum, the following roles are required:

- Administrator:
 - A named person, responsible for communicating PERT contact details to parent PERT and users.
 - Likely to be a part-time role or on best-effort basis.
- Technician(s):
 - Responsible for receiving, investigating and, if necessary, escalating cases.
 - Part-time or full-time role or on best-effort basis.

PERT ROLES AND RESPONSIBILITIES (2)

In addition to an administrator and technicians, NREN and Regional PERTs are strongly recommended to have:

- PERT Manager -
 - Named individual.
 - Has overall responsibility for the PERT.
 - Point of escalation.
 - Part-time role.
 - The manager may also be the technician and / or the administrator.
- Deputy PERT Manager -
 - Responsible for the PERT in the manager's absence.

SKILLS AND EXPERIENCE REQUIRED (1)

Technical group:

- Qualification and / or experience in network management.
- Good knowledge of TCP/IP.
- Knowledge of Ethernet and / or other relevant data-link / physical layer protocols.
- Good knowledge of own network's topology, policies and configuration.

SKILLS AND EXPERIENCE REQUIRED (2)

Pert Manager / Deputy Manager:

- Managerial / supervisory skills.

Administrator:

- Good communication skills.
- Co-located, or in regular contact with, rest of team.

All team members:

- Competent written and spoken English.
 - Required for national PERTs; encouraged for other PERTs.