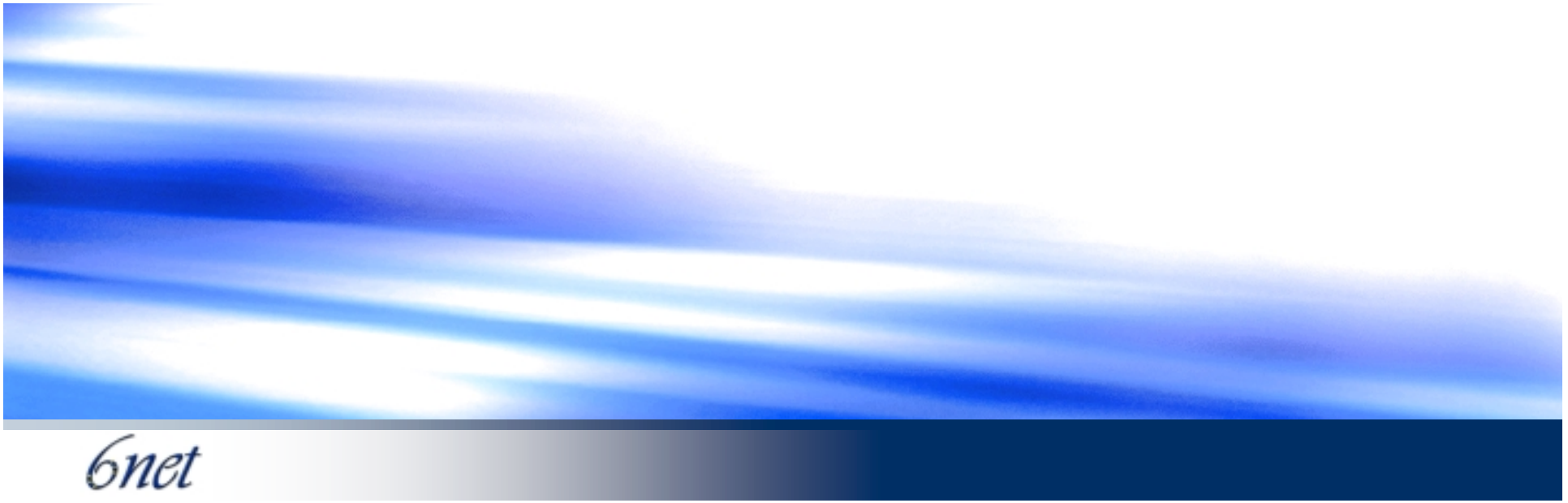

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Information Society Technologies

ISISv6/BGP Fast Convergence Tuning

CISCO SYSTEMS

The goal of this session?

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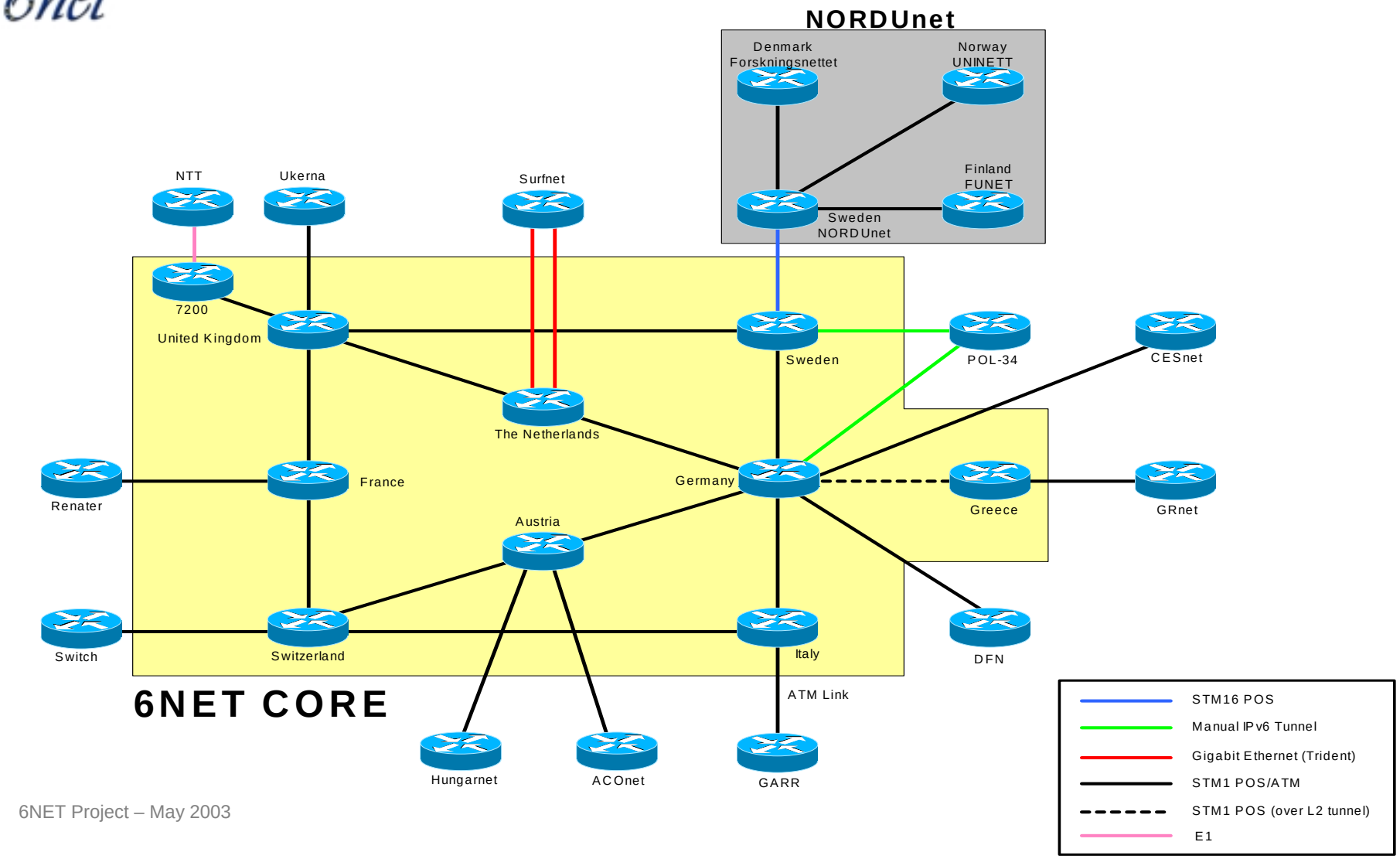
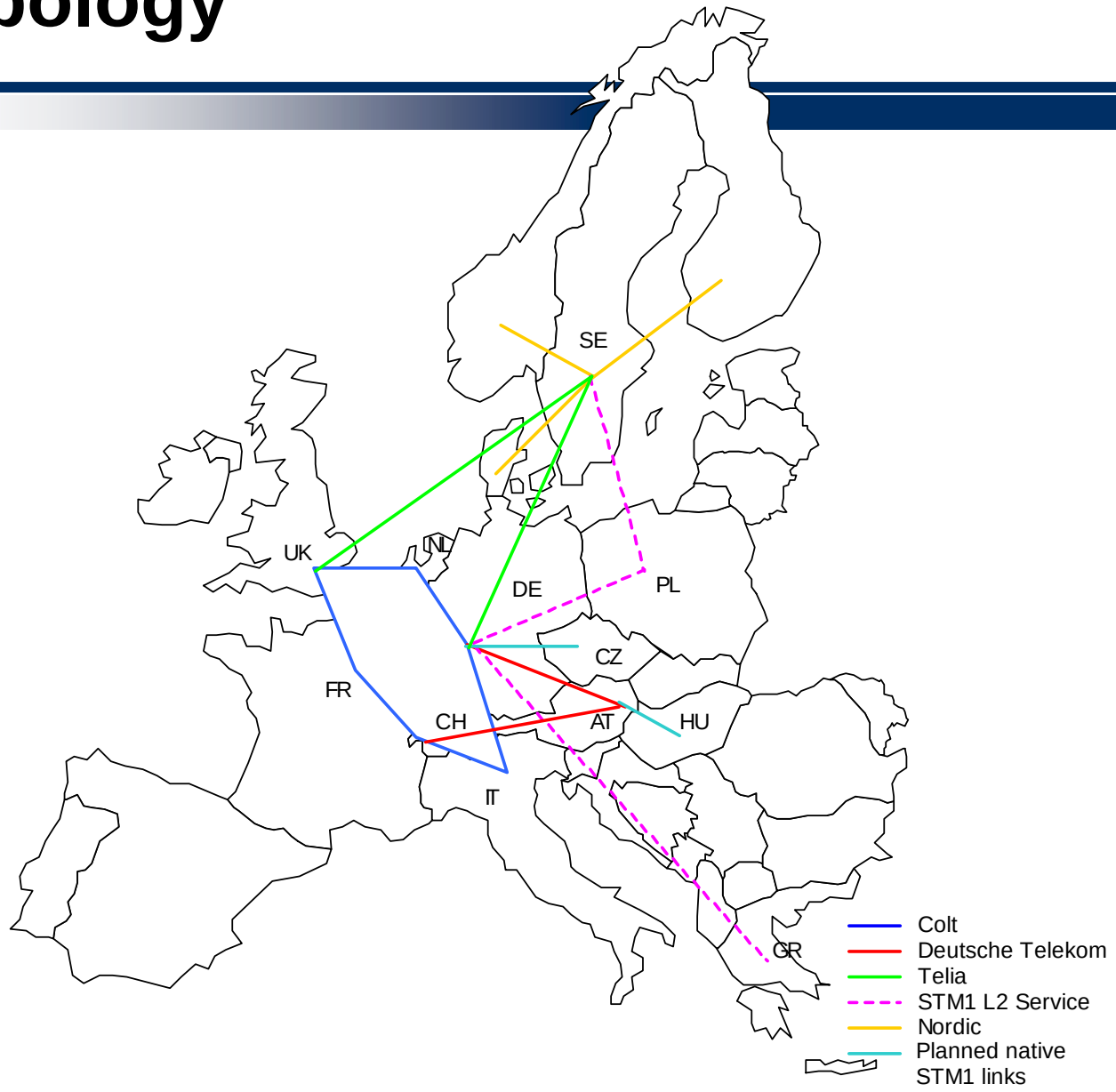
- **Leverage tuning experience from the IPv4 world (No need to re-invent the wheel)**
- **Understand the topology and respective tuning currently implemented on 6NET topology**
- **Minimize unexpected and expected downtime**
- **Understand the effect of the tuning and produce initial IPv6 Best Practices**

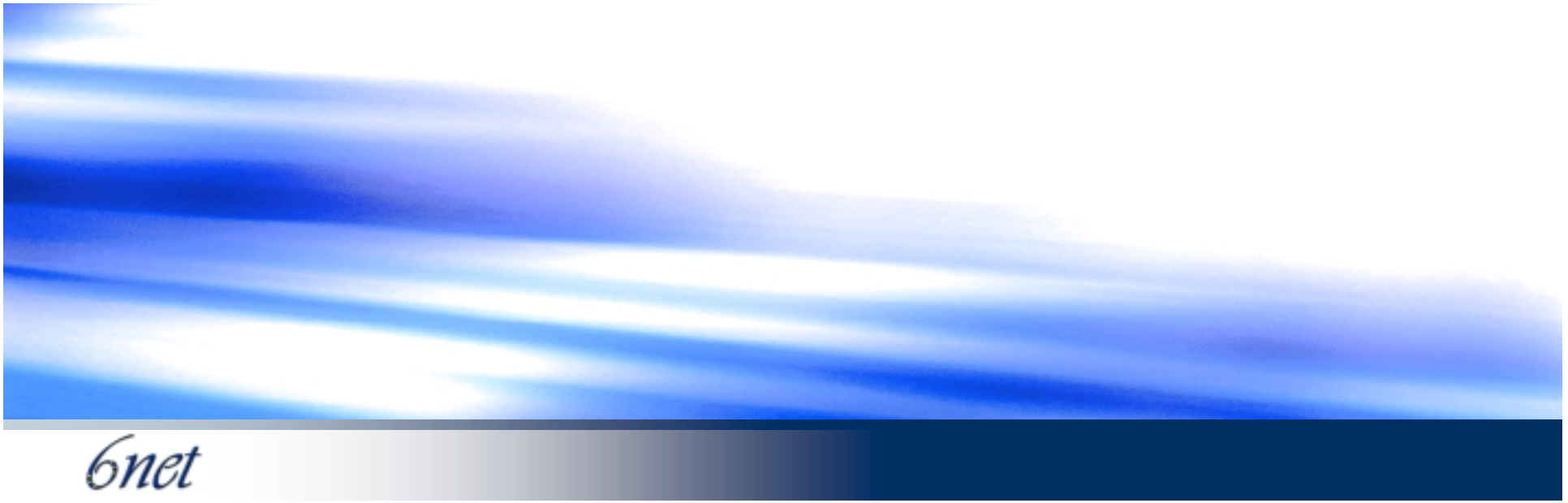
The 6net Layout – 14 April 2003



Core topology

Up and running





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Tuning Details

Cisco Systems

The three pillars of the 6net Fast Convergence Tuning

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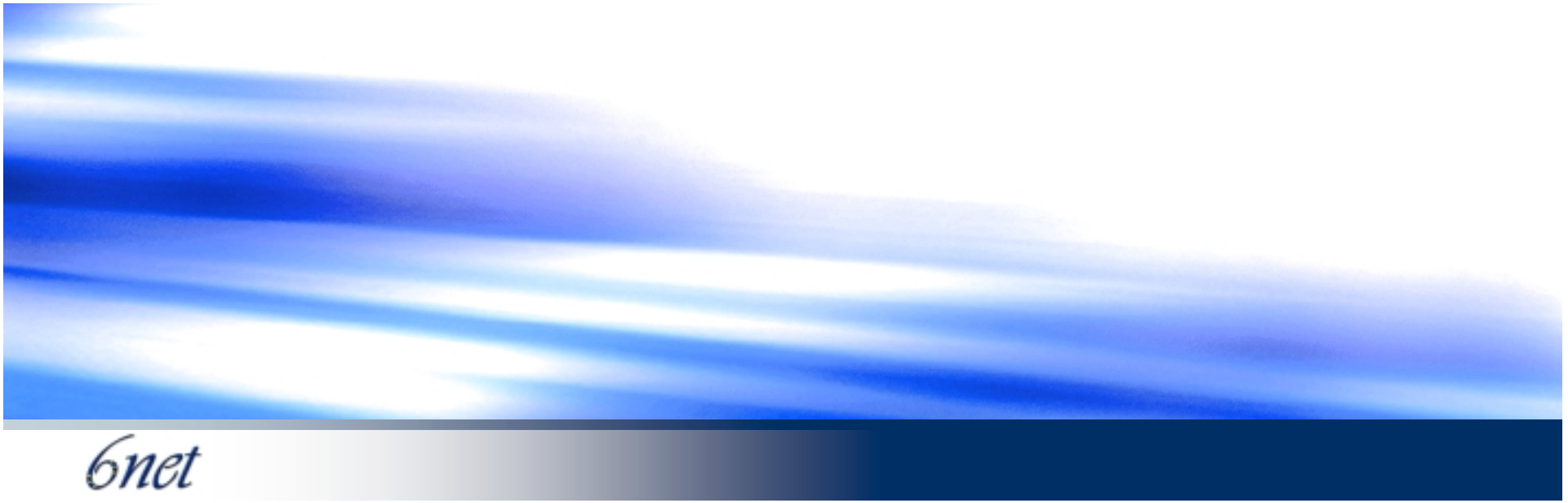
- Interface Stability Tuning
- ISIS Tuning
- BGP Tuning



Interface Stability Tuning

Goal?

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- **Enhance the administrative shutdown procedure of an interface**
- **Make a Packet-over-Sonet (POS) interface react faster on link-down triggers**
- **Isolate interface transitions to a single box**
- **Create more awareness on POS errors**

Interface Stability Tuning

6net

- **Making the remote peer aware that our interface is administratively shutting down:**

  pos ais-shut

- **Tuning POS responsiveness towards carrier drops:**

  carrier-delay msec 0

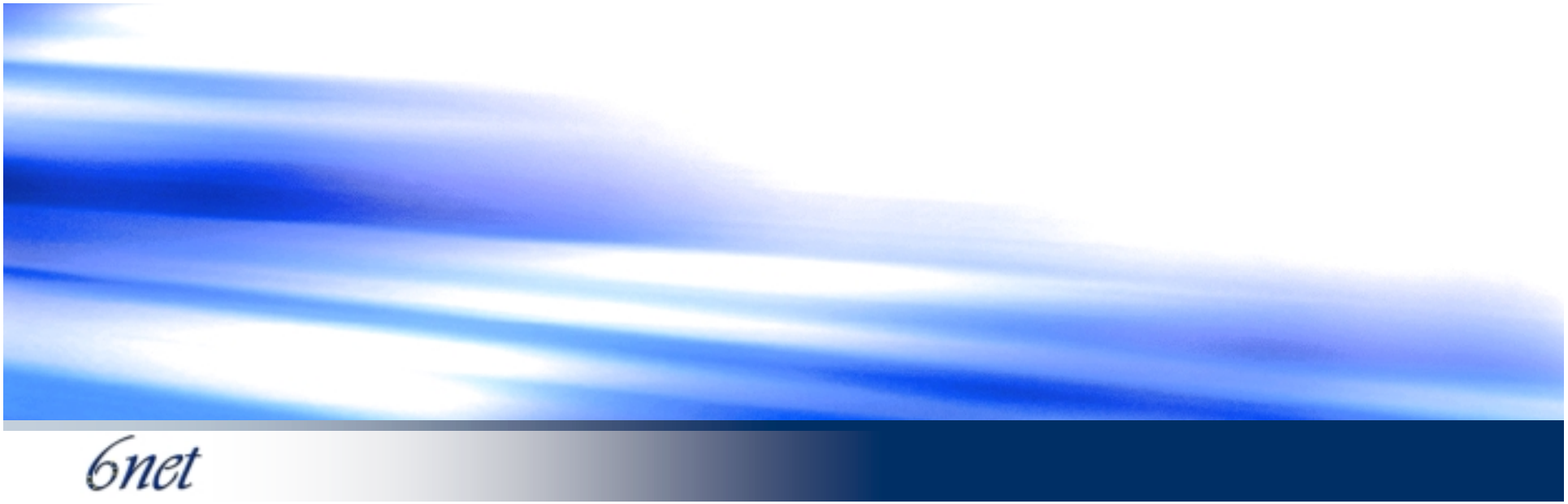
  (Note: 16msec is a good value to be used in operational environment)

- **Enabling of interface dampening:**

  Dampening

Interface Stability Tuning (Cont.)

- **Improve POS reporting functionality:**
  - **pos report lrdi**
  - **pos report lais**
  - **pos report prdi**
  - **pos report pais**
  - **pos report slos**
  - **pos report slof**
  - **logging buffered errors (to capture link events)**



ISIS Tuning

Goal?

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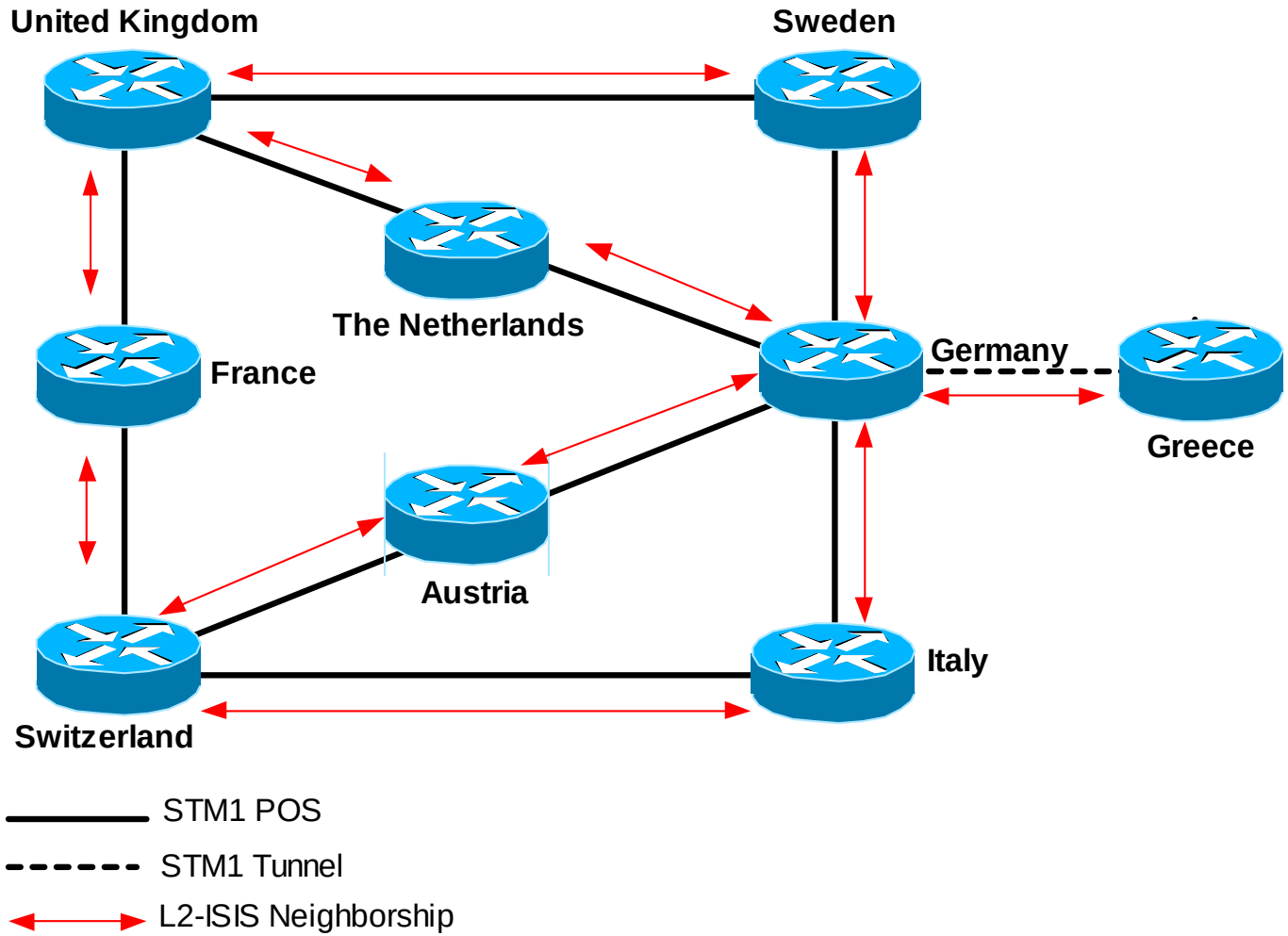
- **Design the topology database to be as small as possible**
- **Stabilize the network in case an ISIS router is seeing too many topology changes**
- **Decrease the ISIS communication overhead**

IGP routing: ISIS



ISIS Process Details

- L2-only neighborship will be utilized (no L1 anywhere)
- ISIS backoff algoritm tuning
  - Tuning the time between two consecutive SPF recalculations (default= 5 seconds):

    Spf-interval 1 1 10
  - Tuning the time between two consecutive Partial topology recalculations (default= 5 seconds):

    Prc-interval 1 1 10
  - Tuning the time between two consecutive ISIS Updates (default= 5 seconds):

    Lsp-gen 5 1 50

ISIS Process Details (Cont.)

- following non-default Cisco ISIS parameters will be enabled:
  - •Removing IIH MTU Padding:
    No-hello-padding
  - •Increasing the Maximum size of a ISIS lsp:
    lsp-mtu 4352

SPF, PRC, LSP-gen timers

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- **spf-interval <a> [<b> <c>]**
  - **<a> Time between SPF runs**
  - **<b> Time between first trigger and SPF**
  - **<c> Time between first and second SPF**
    - **<a> is in secs, <b> and <c> in msec**
- **Same syntax for prc-interval**

SPF, PRC and LSP-gen (Cont.)

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- Example: spf-interval 10 100 1000
- Suppose we decide to run an SPF, wait 100 ms, then run SPF
- Wait at least 1 sec before running a second SPF back-to-back (if needed)
- Suppose we need to run a 3rd SPF, right after, now wait at least 2 sec

SPF, PRC and LSP-gen (Cont.)

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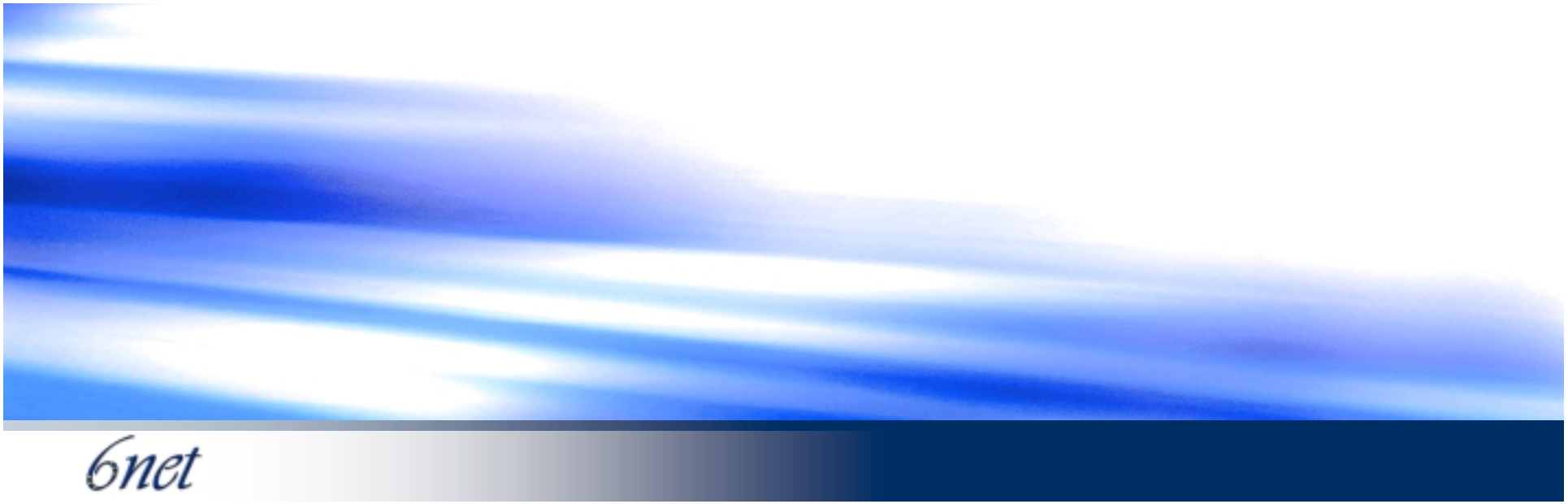
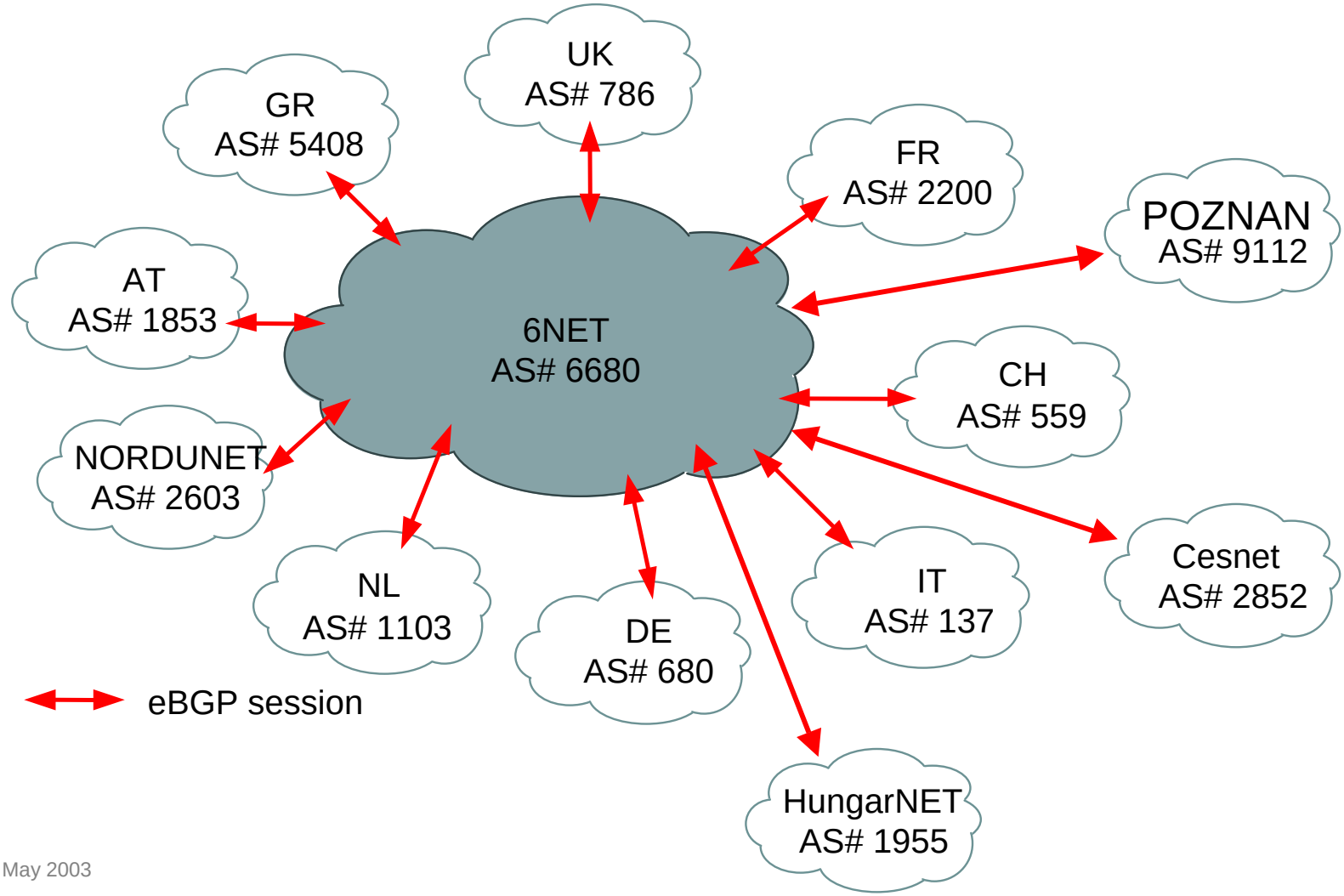
- **Wait at least 4 sec before next SPF, then 8 sec, then 10 sec, 10 sec, etc.**
- **When the network calms down, and there were no triggers for 2 times the minimum interval (20 sec in this example), go back to fast behaviour (100 ms initial wait)**



BGP Tuning

High Level 6NET Overview



BGP Tuning

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- **BGP tuning is executed in two areas:**

  (a) Tests have proven that there is direct correlation between the BGP convergence and the amount of BGP control packets lost

  (b) BGP tuning to enhance the BGP process behaviour

BGP Tuning (Cont.)

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- **Avoiding BGP control-packet loss:**
  - **Enhance the TCP session configuration:**
    - **ip tcp path-mtu-discovery**
    - **ip tcp window-size 65535**
  - **Increasing the Interface Packet Input Queues:**
    - **hold-queue 1500 in**
    - **SPD headroom 1000**
    - **SPD extended 1000**

BGP Tuning (Cont.)

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- **BGP Process Tuning:**
  - **Enhance BGP update generation**
    - **Usage of Peer groups**
  - **Speed up BGP Update propagation**
    - **Internal neighbors advertisement-interval 1 second (default: 5 seconds)**
    - **External neighbors: advertisement-interval 5 seconds (default: 30 seconds)**
  - **Avoiding needless BGP session restarts**
    - **Graceful Restart Capability Support**
    - **Disabling of 'bgp fast-external-fallover'**


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