Internet Issues
One outlook for 2003 and beyond
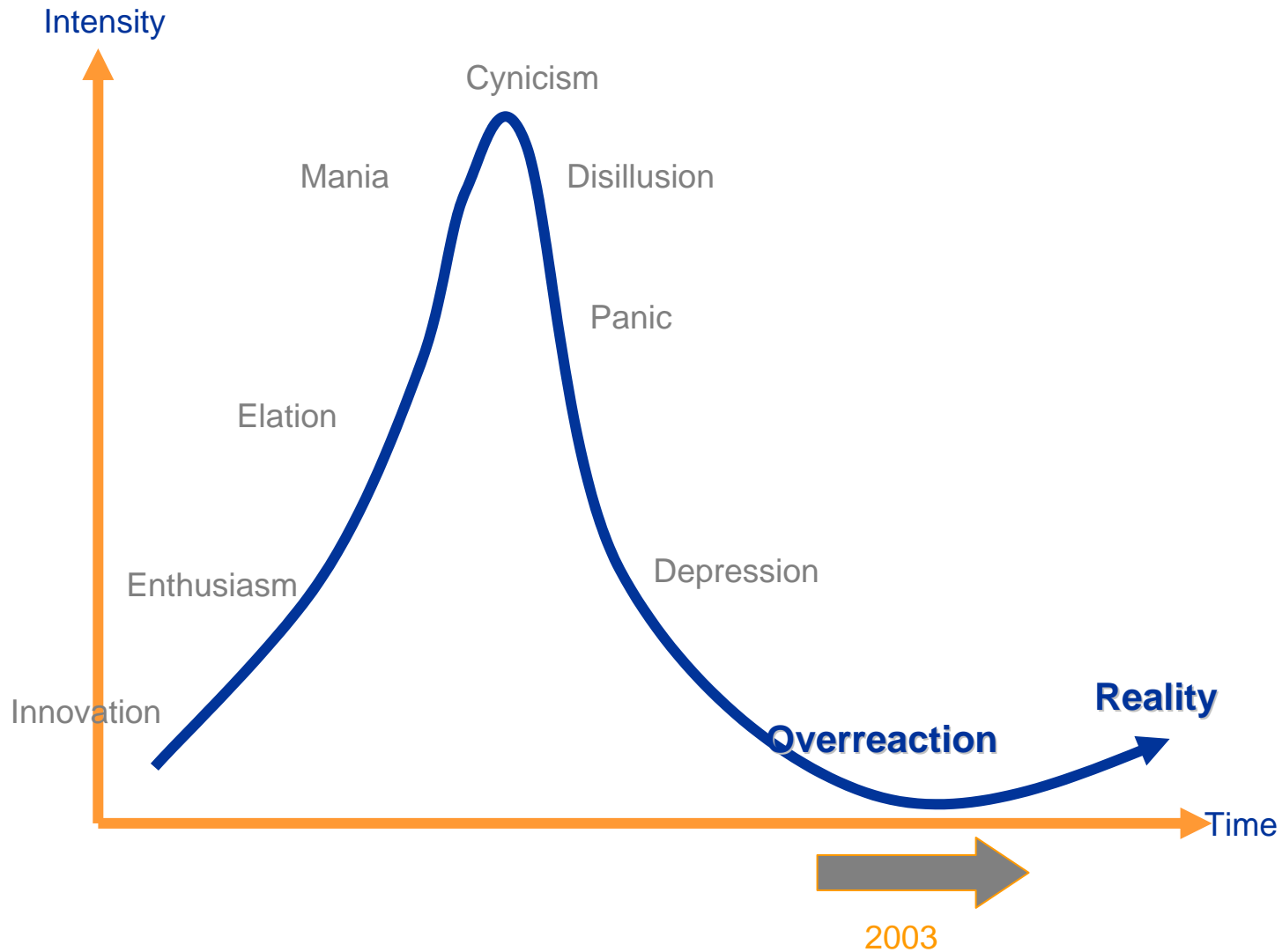
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It's a post-dot-boom-and-bust world …

NAS/NMS COMPSITE
as of 16-Jan-2003

Intensity

Cynicism

Mania

Disillusion

Panic

Elation

Depression

Enthusiasm

Reality

Overreaction

Innovation

Time

2003

After: Gartner

Today

- ISPs can no longer operate a rapid expansion-based business model
  - Business models are tending to use a common theme of service consolidation
- Attention is now concentrating on aspects of the Internet service model:
  - Quality and performance
  - Dependability and integrity
  - Utility and flexibility
  - Value-add service models
  - Innovative applications and services

From Optimism to Conservatism

- A conservative period of careful expansion rather than explosive growth
  - Investment programs need to show assured and competitively attractive financial returns across the life cycle of the program
  - Reduced investment risk implies reduced levels of innovation and experimentation in service models
  - Combine communications with additional services to create value-added service bundles
  - Accompanied by greater emphasis on service robustness and reliability

Security Focus

- A highly visible security focus for the next few years

  - Increased end-user awareness of vulnerabilities and weaknesses and a desire for more secure and trustable services

  - Increased public sector agency awareness of the vulnerabilities of the Internet communications environment and its consequences

  - A response based on increased technology effort in dismantling aspects of the Internet's distributed trust model and attempting to replace it with negotiated conditional trust

  - Expect encryption and authentication at many levels of the IP protocol suite

Multiple Networks

- Recognise IP's strengths and weaknesses
  - ☺ IP allows adaptable traffic sessions to operate extremely efficiently over wired networks
  - 😐 IP is not the optimal approach to support:
    - mobile wireless traffic
    - resource management requirements
  - ☹ IP is not strong in supporting:
    - real time traffic under localized congestion events
    - various forms of traffic engineering applications

- Continued use of multiple networks to provide specialized service environments for various application sectors for some time yet

Broadband Last Mile

- An steady continuation of the shift to a pervasive broadband access model for IP
  - Gradual phase out of modems as the dominant IP access device
    - Here are many externalities that determine the speed of this trend
  - Industry concentration on deployment of fibre, coax and DSL based last mile networks

- What form of Broadband Access?
  - Wireless is probably not a logical contender for ubiquitous last mile
  - Hybrid Fibre Coax systems are capital intensive and often rely on a strong pay-TV market to provide some capital leverage
  - Fibre is great – but its also capital intensive – good for CBD and MTA deployments but less capital efficient for low density deployments
  - DSL is a reasonable compromise for lower density deployment environments

Bandwidth Abundance

- Dense Wave Division Multiplexing is lifting per-strand optical capacity
  - from 2.5Gbps to 6.4Tbps (640 wavelengths, each of 10Gbps per lambda) per optical strand
- The major long haul communications routes worldwide are more than amply provisioned with IP bandwidth
  - The shift from demand-pull to supply-overhang is impacting the business stability of the long haul communications supply market.

- V4 remains the overwhelmingly dominant protocol choice
  - 32 bit (4G) address space
    - 65% allocated
    - 32% deployed
    - 5%- 10% utilization density achieved
    - Consumption at a rate of 32M addresses p.a.
  - Anticipated lifespan of a further 10 years (at most) in native mode
  - Indefinite lifespan in NAT mode
    - But NAT has its own problems!

Technology – IPv6

- "IP with larger addresses"
- Address space requirements are no longer being easily met by IPv4
- This is an issue for high volume deployments including:
  - GPRS mobile
  - Pocket IP devices
  - Consumer devices
- IPV6 appears to offer reasonable technology solutions that preserve IP integrity, reduce middleware dependencies and allow full end-to-end IP functionality for a device-rich world

Sony DCRTRV950

- Playback Zoom
- i.LINK (IEEE1394) IN / OUT
- Video IN / OUT
- S-Video IN / OUT
- Audio IN / OUT (Stereo)
- USB Terminal
- Intelligent Accessory Shoe
- Headphone Jack (Stereo)

- NPQM91: 370 min

Network Function
- Bluetooth Standard: Ver 1.1
- Email: SMTP, POP3
- Web Browser
- HTML: HTML3.2, Frame. JavaScript, SSL (V2/3)
- Image: GIF, JPEG, XBM, PNG

Wireless

- *In theory*
  - IP makes minimal assumptions about the nature of the transmission medium. IP over wireless works well.
- *In practice*
  - high speed TCP over wireless solutions only works in environments of low radius of coverage and high power
  - TCP performance is highly sensitive to packet loss and extended packet transmission latency
- 3G IP-based wireless deployments will not efficiently interoperate with the wired IP Internet without adaptive media gateways
  - Likely 3G deployment scenario of wireless gateway systems acting as transport-level bridges, allowing the wireless domain to use a modified TCP stack that should operate efficiently in a wireless environment
- 802.11 is different
- Bluetooth is yet to happen (or not)

Services and Middleware

- WWW caching technologies will mature with the addition of a more generic approach to include aspects of:
  - Interception technologies
  - Open pluggable edge service technologies
- Service provision and IP Anycast to create improved resiliency for critical infrastructure elements
- Directory technologies and mapping of disparate protocol and services domains into the IP world
  - ENUM to provide a mapping from E.164 to IP service points
- Public Key Certificate structures
  - Are as needed now more than ever!

So what can we expect?

- My personal list of expectations for the next few years:
  - No repeat of boom and bust
  - Conservative business objectives with conservative returns
  - Continued levels of regulatory interest to ensure that public objectives are being achieved
  - Continued expansion of the underlying infrastructure
  - Sector members with longer term objectives phrased more modestly than may have been the case in the past five years

Thank You

- Questions?