NEW NSFNET BACKBONE SERVICES

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Bob Aiken

raiken@nsf.gov

202 - 357 - 9717

World's Largest Burrito

- by TACO TICO of Nebraska, INC (6 / 29/ 91)
- in Newton Kansas
- 1,597 feet long
- constructed of :
    * 2,557 tortillas
    * 607 lbs of refried beans
    * 75 lbs of shredded cheese

NSF's GOAL :

"to maintain and enhance the health and vitality of our nation's research and education enterprise"

Dr. Massey, 12 / 6 / 91

NSF's CHARTER :

"to foster and support the development and use of computer and other scientific methods and technologies, primarily for research and education in the sciences."

NSF Statutory Authority (PL 81-507)
revised November 1976

NSF's NREN Mandates

- Upgrade NSFNET backbone
- Assist Regionals to upgrade capacity and capabilities
- Allow Federal agencies to connect to NSF networks
- Allow commercial service providers to interconnect with Federal R&E networks for R&E support
- Support HPCC requirements
- Accelerate technology development and deployment
- Acquire commodity services from private sector
- Coordinate IINREN Activities

Advice and Constraints

- FARNET wanted choice of service providers
- Mission Agencies wanted "hardening of regionals" and stability of NREN during evolution
- At least 2 service providers and Routing Authority (from 11/91 National Science Board)
- NSF should not compete in a commodity marketplace
- NSF needs to entice cooperative agreement participants
- Extend the periphery of NSFNET (k-12, 2yr schools, libraries, ...)

STRATEGY

- Advance the leading edge of networking technology and servcies

- Increase the ubiquity of network access to the research and education community

- Accelerate private sector technology development and deployment

Strategy (cont.)

- Using Carrier facilities, NOT laying fiber or building a physical network

- NOT building a general-use "national information infrastructure"

- Driving technology and seeding the market, NOT building a perpetual private sector competitor

- NOT building an entitlement program for any established structure or enterprise

ADVANCING the LEADING EDGE

- beta test and deploy new technologies, protocols, and services, such as :

  * high speed isochronous broadband capabiltities

  * advanced routing technologies (e.g. Policy based and source routing)

  * advanced capabilitiy network interconnection points

  * security (e.g. authentication, access control, ...)

ADVANCING the LEADING EDGE ISSUES

- initiating and evolving standards
- "guaranteed " resources
- security
- cost and industrial collaboration

Enhancing Ubiquitous Access

Increase the number of sites and users on the network by:

* enhancing the NSF Connections Program

* making it easy for private sector service providers to interconnect to the R&E community

* providing for interconnection points for differing technologies, services, and service providers

* using and supporting open standards , such as IP CLNP, BGP, and IDRP

* enhancing security

Ubiquitous Access ISSUES

- appropriate use
- commercial services ("commercialization")
- interconnection with private networks ("privatization")
- directory and other user services
- subsidy and sunset
- security

TECHNOLOGY ACCELERATION

- Proof of Concept on how to design and implement data network technologies and topologies, such as :

  * Network Access Points for rich interconnectivity

  * Development of administratively and technically autonomous networks (e.g NSF regionals)

  * Scaling of :
    routing technologies and protocols,
    network management techniques,
    network information services,
    directory services,
    security techniques

TECHNOLOGY ACCELERATION ISSUES

- proof of concept
- proof of market
- upgrades and evolution
- risk, timing, and cost

NATIONAL NETWORKING ACTIVITIES

- solicitation for information services (closes 5/18/92)
- x.500 interoperablity project
- participation in doe's smds project
- connection of nasa & darpa sites to nsfnet backbone
- hardening of regionals: workshop 2/11/92
- security workshop: 7/6/92
- nsfnet engineering group
- solicitation for new nsfnet backbone services

Features of NSFNET Backbone Services

* Advanced R&E Backbone service
* Network Access Points (NAPs - AUP free)
* Routing Arbiter (RA)
* Regional Networks
* Private Network Service Providers

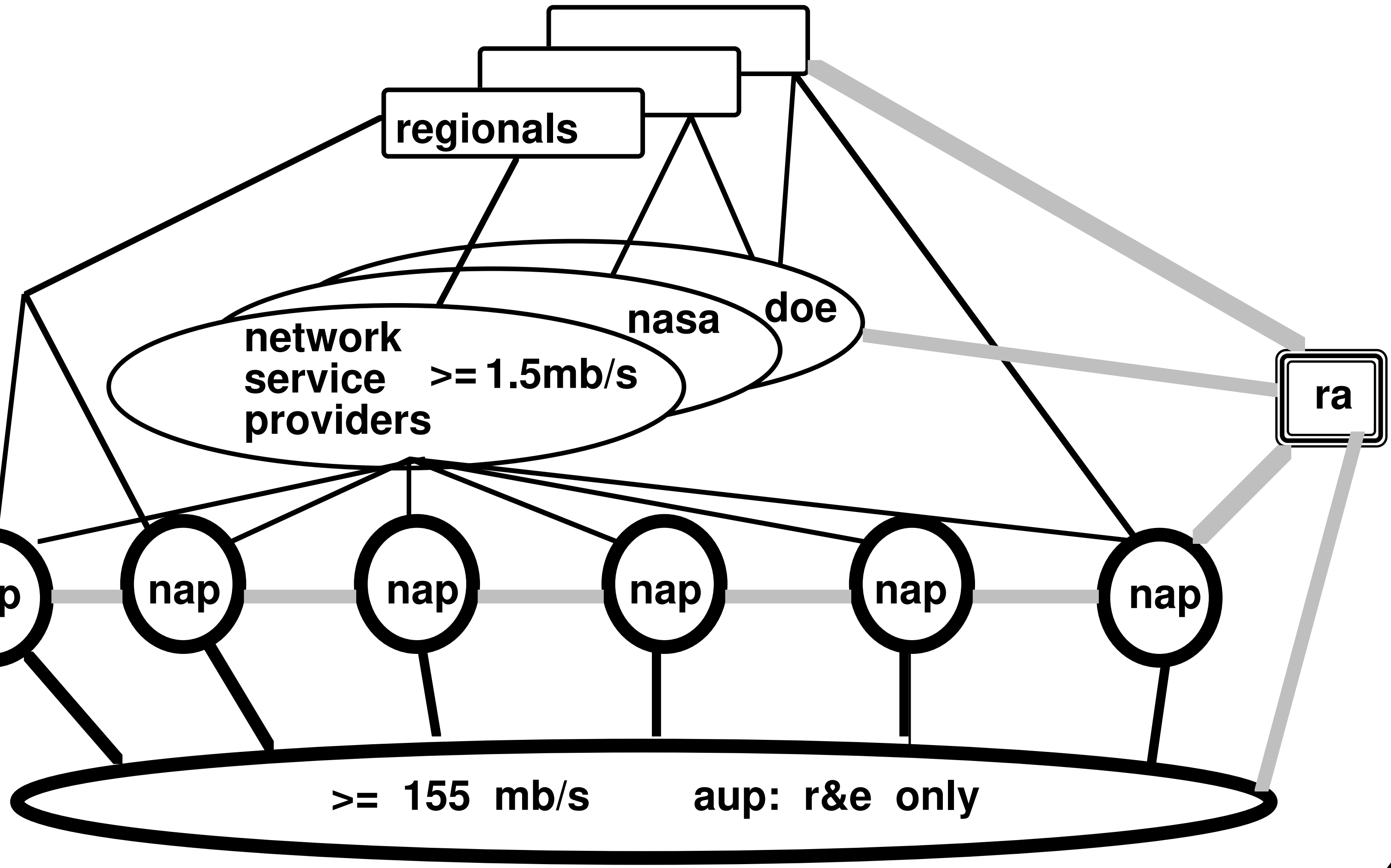
- 2 New Solicitations

* High End R&E Backbone Services
* NAPs and RA

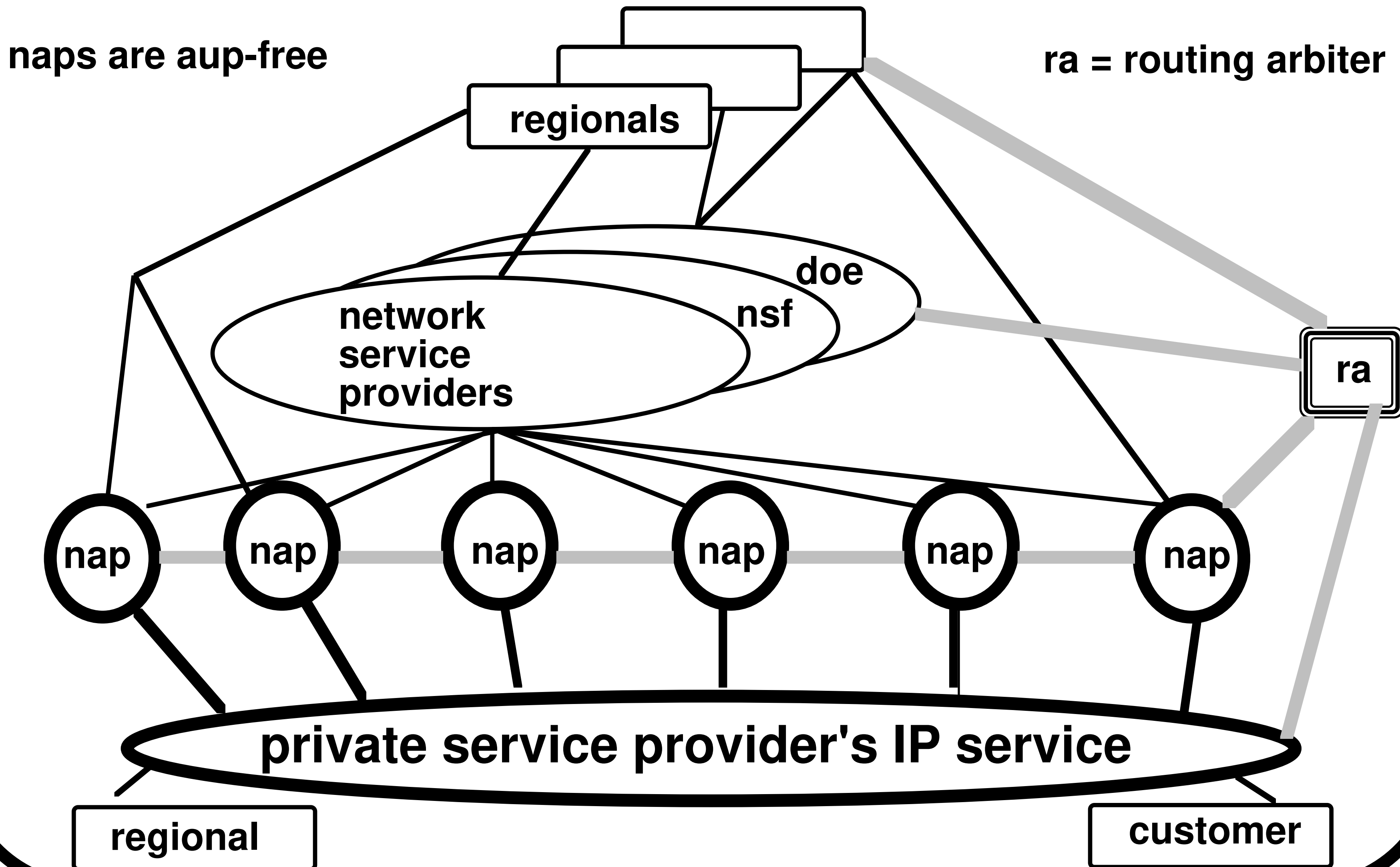
NSF's View of NSFNET

naps are aup-free

ra = routing arbiter



Private Service Provider's View of NSFNET



Advanced R&E BB Services

Must

* provide for 155 mbs broadband services that interconnects NSFNET Network Access Points (NAPS)
* implement and support IP , CLNP, BGP and IDRP
* participate with NSF in the development of advanced routing technologies
* support video teleconferencing
* subscribe to authority of Routing Arbiter
* implement higher bandwidths as soon as possible

Network Access Points (NAPs)

- NAPs are AUP free and can be implemented as a MAN or LAN
- Cost of NAP and RA will be pro-rated and shared among those connecting to it
- All NAPs will have at least 1 route server which supports BGP, IDRP , IP and CLNP
- NAP must be at least 100mbs and be able to grow with demand and usage
- NAP must provide appropriate accounting capabilities
- To connect to a NAP, a service provider must meet NSF's minimum NAP attachment requirements

NSF's Minimum NAP Attachment Requirements

- Networks Attaching to a NAP must support:

  * 1.5 mbs speeds and up
  * IP and CLNP
  * BGP and IDRP
  * Video Teleconferencing

- Must pay pro-rated shared cost of NAP and RA

- Must subscribe to the Routing Arbiter

Routing Arbiter (RA)

- Routing Arbiter must not be either a High End or a Network Service Provider (or subsidary of either) attaching to a NAP

- Both High End and Network Service Providers must subscribe to the authority of the RA (who reports to NSF)

- RA will maintain and run a route server (with the Global Routing Database) at each NAP and will provide for maintenance and operation of the NAPs

- Participate with NSF to advance new routing technologies

NETWORK SERVICE PROVIDERS

- Must subscribe to authority of RA (if they connect to a NAP)
- May connect to one or more NAPs and pay a pro-rated cost for each NAP attachment (includes RA and NAP support)
- Must meet NSF's minimum NAP attachment requirements in order to attach to the NAP

REGIONALS

- Regionals will be given some funds for connecting to a Network Service Provider (NSP) of their choice (process t.b.d) or to a NAP

- Subsidy funds for connecting to the NSP or a NAP will decline to $0 by 1996. (e.g. 100% 1st yr, 60% 2nd yr, ...).

- Regional subsidies will shift to support upgrades in capabilites /capacity and supporting the end user and institution (e.g. CONNECTIONS Program)

- Can change network provider selection