

# Background to Internet and the web

## 互联网与网络背景

Simon Mahony

[s.mahony@ucl.ac.uk](mailto:s.mahony@ucl.ac.uk)

This presentation contains material taken from a Master's level module, Internet Technologies, taught at the Department of Information Studies, University College London and several workshops run in Chinese Universities. For more details and the rest of the collection see the cover sheet at: <http://uclouer.eprints-hosting.org/54/>

Supported by



# Acknowledgements

With thanks and acknowledgement for the translations and processing of these files to [Yaming \(Cindy\) Fu](#) research student at the Department of Information Studies, UCL

Also with thanks to Ning Ma (UCL DH Master's student)

# Background to Internet and the web

## 互联网与网络背景

- What is the Internet?  
互联网是什么
- Context and background  
背景
- Web resources  
网络资源
- Practical: basic HTML & CSS for webpages  
实验：网页基础的HTML与CSS

# The Internet?

## 互联网

- A computer network connecting several smaller networks  
连接几个较小网络的计算机网络
- A global system of interconnected computer networks  
互相连接的计算机网络的全球系统
- A network of networks  
网络的网络

# The start: ARPANET

## 开端：阿帕网

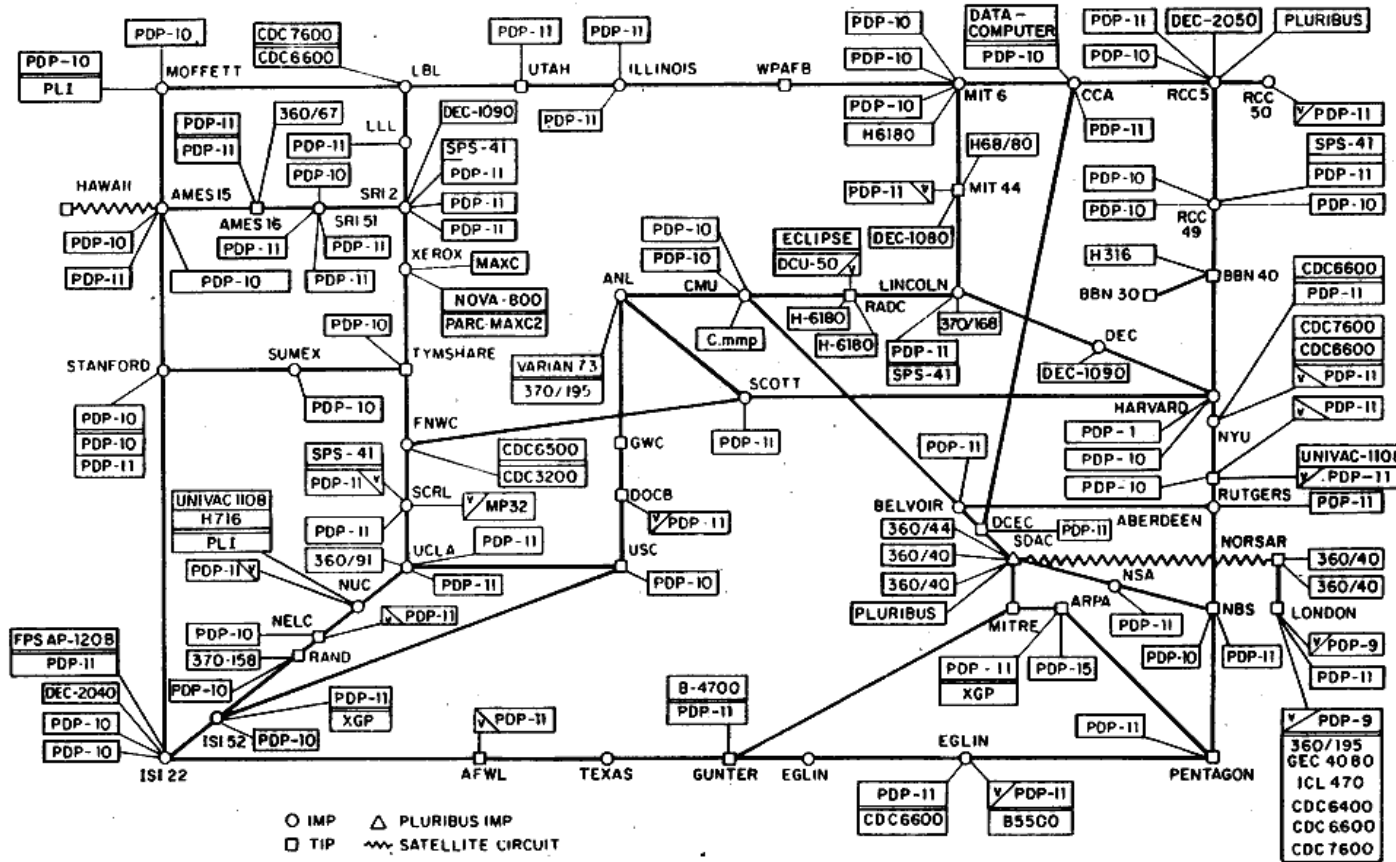
- ARPANET: the ancestor network  
简称ARPA网，阿帕网
- Advanced Research Projects Agency Network  
美国高级研究计划署网络

Part of the US Department of Defense  
美国国防部门的一部分

- Established 1969 建立于1969年
- Also included major US universities 也包括美国主要的大学
  - MIT, Harvard, Stanford, > UCL (1971)



### ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

Source: Wikimedia Commons (Public Domain)

<[https://commons.wikimedia.org/wiki/File:Arpanet\\_logical\\_map,\\_march\\_1977.png](https://commons.wikimedia.org/wiki/File:Arpanet_logical_map,_march_1977.png)>

# MILNET

## 美国军用网络

### Military Network then 'Defense Data Network'

- Separated from ARPANET in 1984  
1984年从阿帕网中分离出来
- ARPANET: academic and research community  
阿帕网：学术和研究团体
- MILNET: US military and US bases abroad  
美国军用网络：美军和美军在海外的基地
  - Includes Europe (NATO bases)
  - 包括欧洲（北约组织）
- Mostly via satellite 大部分通过卫星

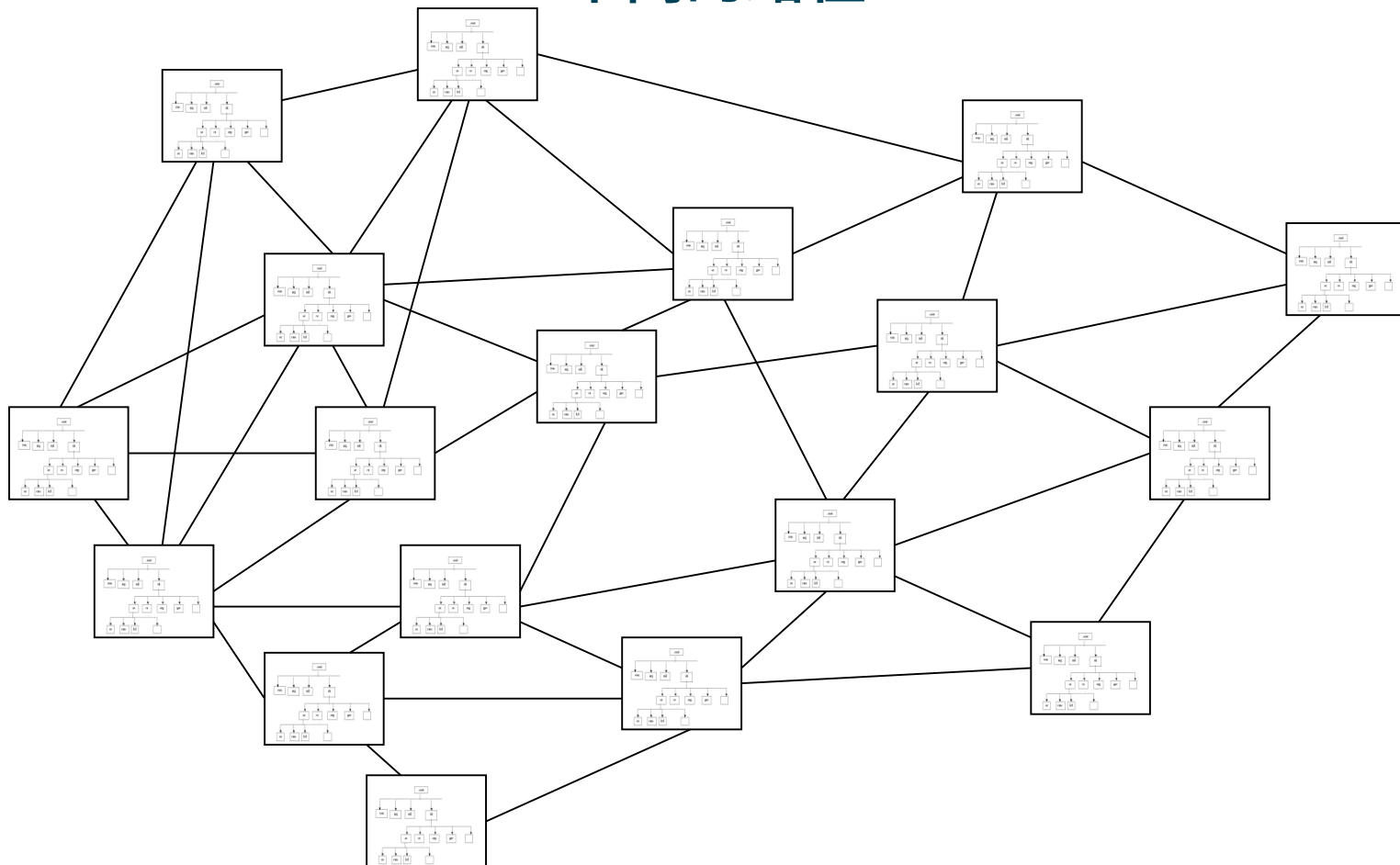


# The Internet: a Network of Networks

网络的网络

## Different pathways

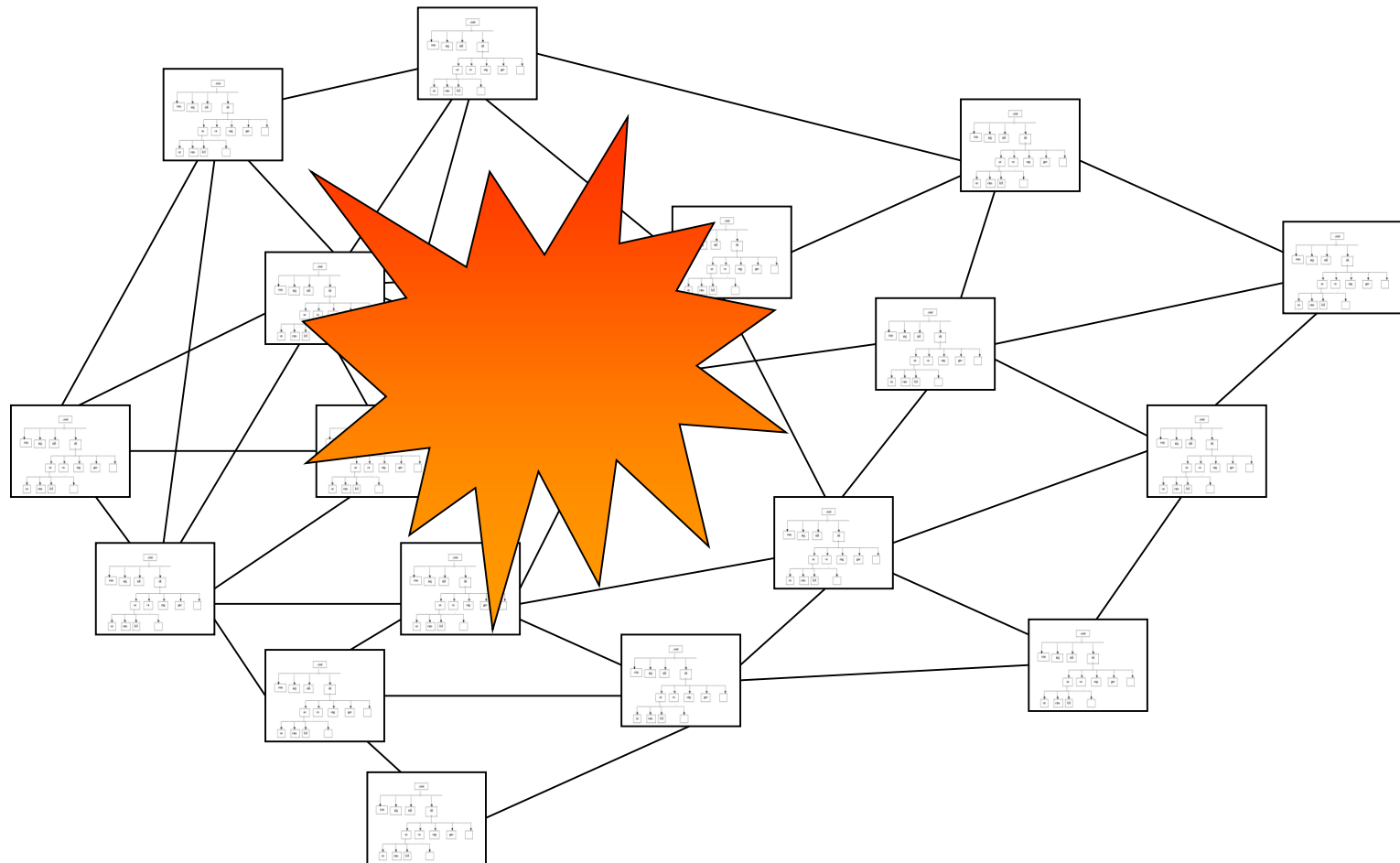
不同的路径



# A Network of Networks

## No single point to cut the network

无单点故障



# Different Internet levels

## 不同网络层级

- Backbone infrastructure 骨干网
  - High-speed networks (高速网络) ;fibre-optics (光纤) ; satellites (卫星)
  - Telecoms and/or government 电信和/或政府
- Mid-level networks 中级网络
  - Traffic between networks 网络流量
    - Companies or government 企业和政府
- Stub network 末端网络
  - Local network 本地网络
    - University – UCL / CAA / SID 高校网络
    - Internet service provider (ISP) 互联网服务提供商

# How to find anything in a network of networks?

## 如何在网络的网中寻找信息？

- Separate the physical from the logical structure.  
从网络逻辑结构中分理出物理结构
- Humans deal with the logical structure.  
人处理逻辑结构
- Machines deal with the physical structure.  
机器处理物理结构
- Conceptual model of domains (领域概念模型)  
administered by ICANN (Internet Corporation for  
Assigned Numbers and Names).  
ICANN 互联网名称与数字地址分配机构

# Understanding the logical structure: web addresses - URLs

## 统一资源定位器

<http://sid.caa.edu.cn/publish/index.html>

- A web address consists of 一个网址包括
  - the name of the protocol (http) 协定名称
  - the host name of the machine 机器主机名
  - the path through the directory to ... 路径
  - the file name (index.html) 文件名

# Domain name system

## 域名系统

<http://sid.caa.edu.cn/publish/index.html>

↑↓ protocol    ↑↓ domain    ↑↓ pathway    ↑↓ filename

domain: sid caa education . china

Every machine connected to the Internet has a unique

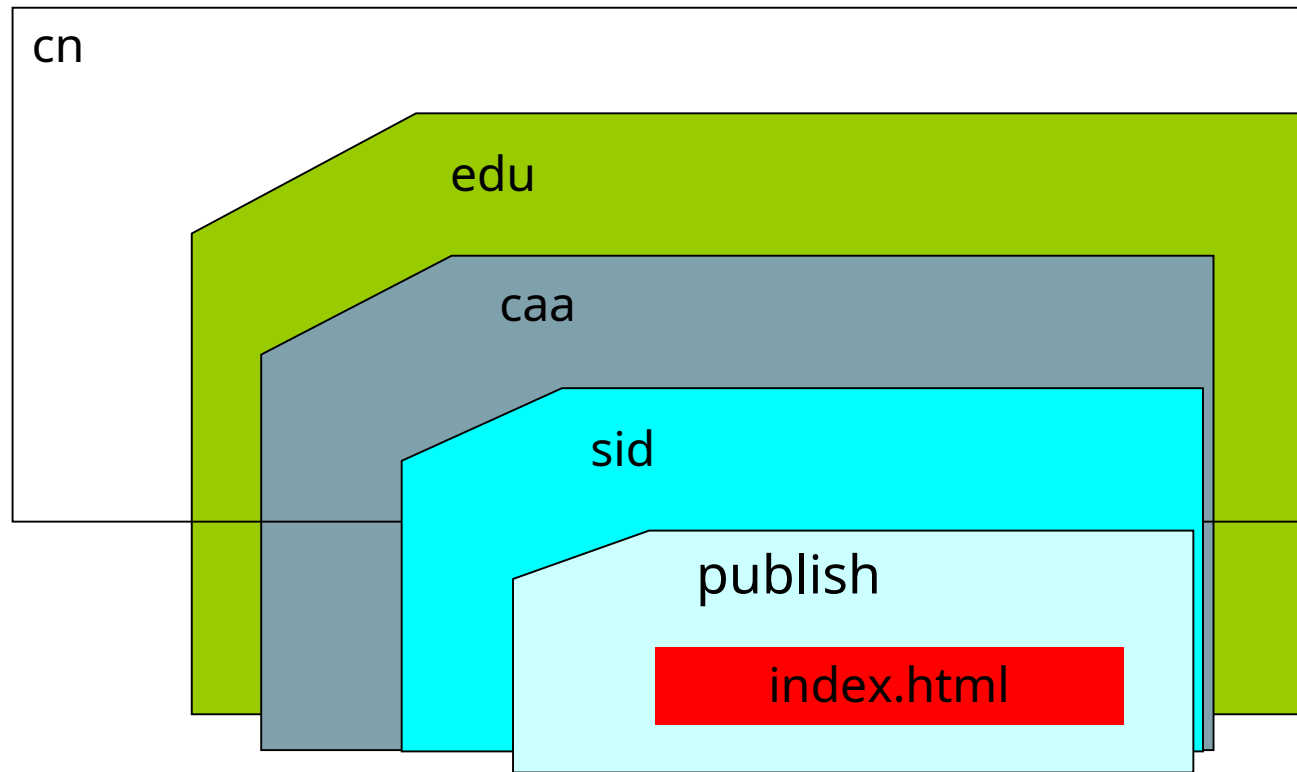
IP address: 32-bit > 128 bit (IP Version 6: [RFC 2460](#))

每一台连接至互联网的电脑都有一个独特的IP地址

E.G.:

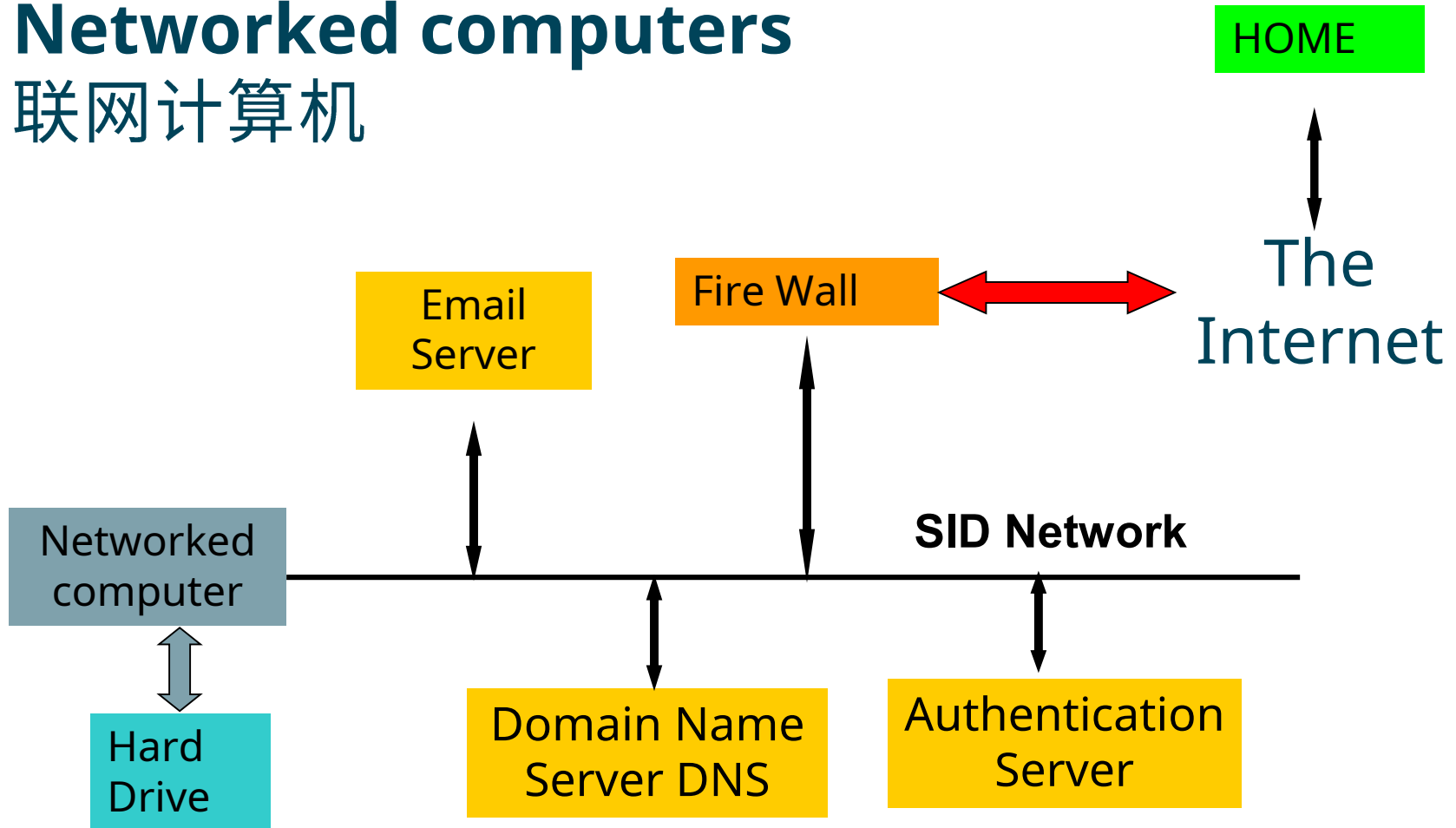
<http://en.caa.edu.cn> has IP address 210.33.124.146

<http://sid.caa.edu.cn/publish/index.html>



# Networked computers

## 联网计算机





# Thin client

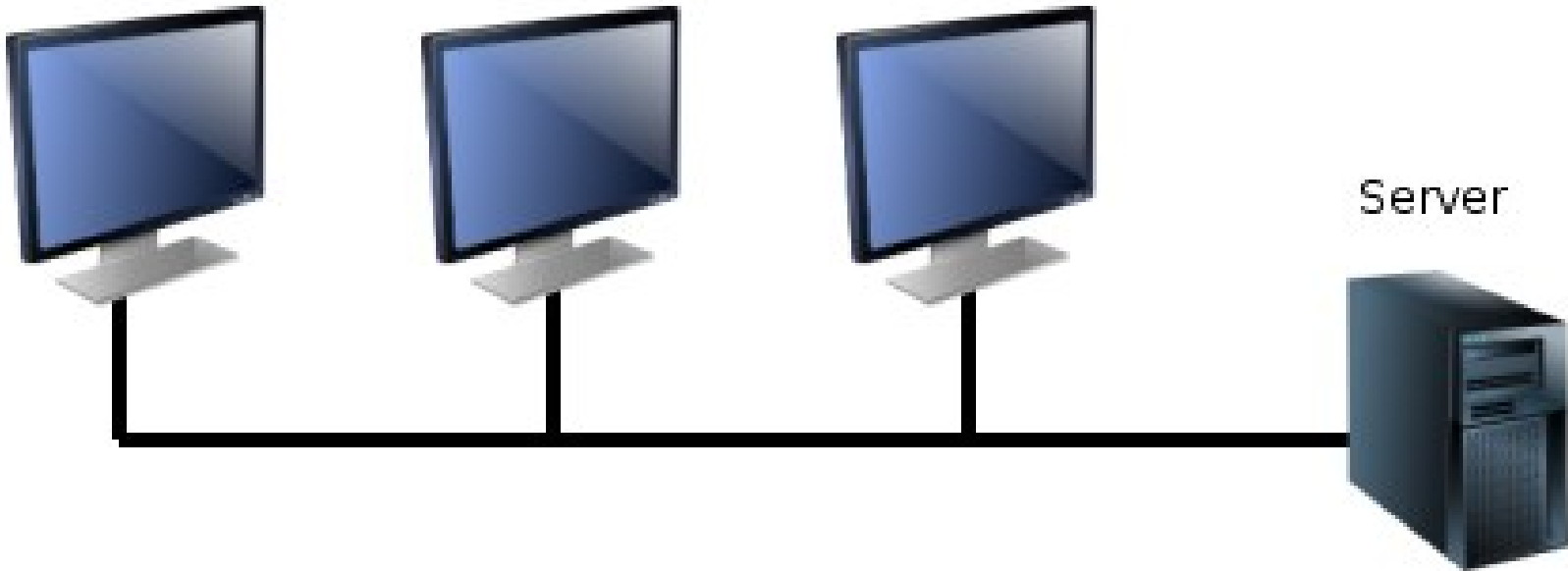
## 客户端

Thin Client

Thin Client

Thin Client

Server



Source Wikimedia commons ([CC BY 3.0](https://upload.wikimedia.org/wikipedia/commons/c/c6/Thin_clients.png)):

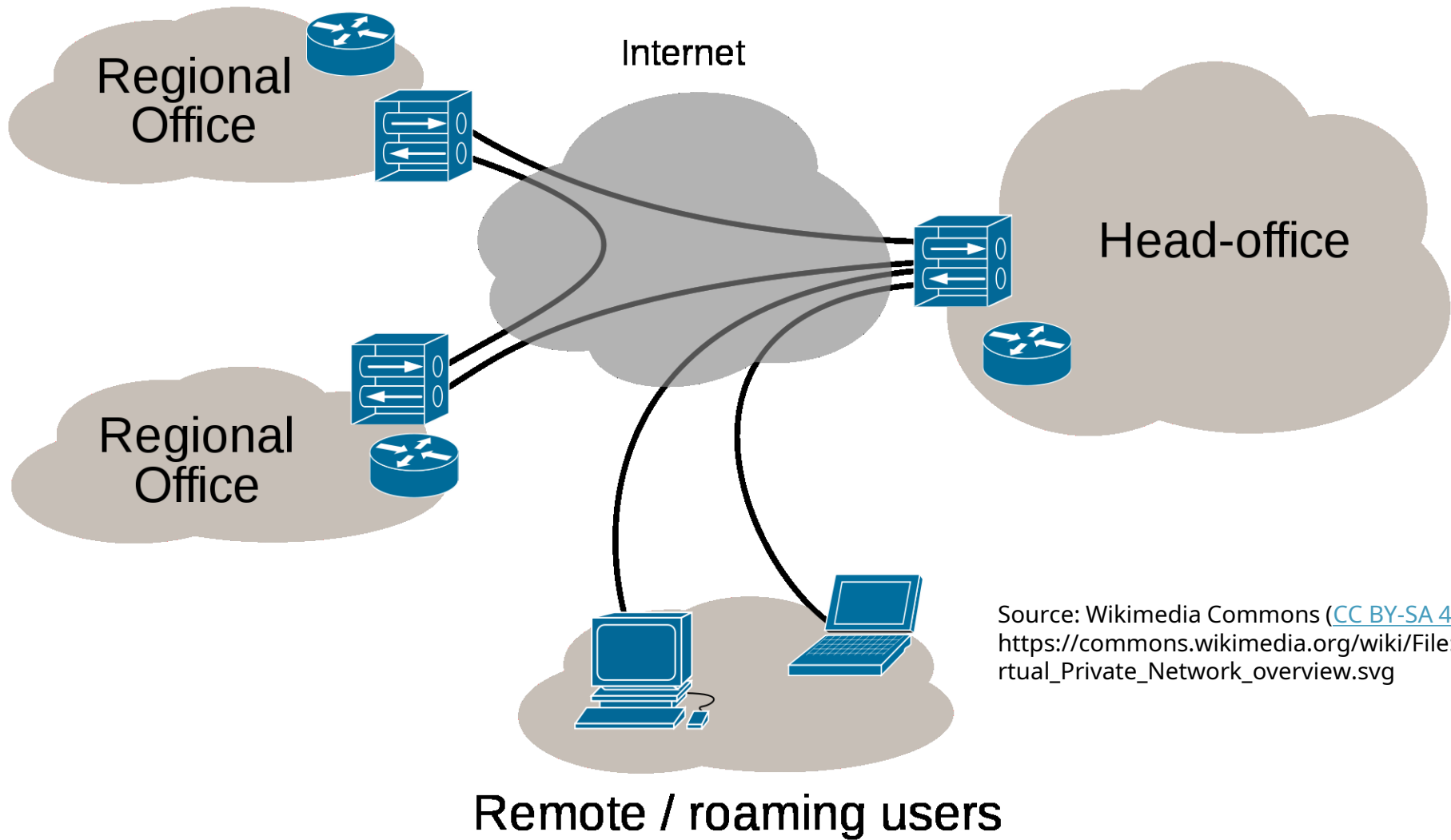
[https://upload.wikimedia.org/wikipedia/commons/c/c6/Thin\\_clients.png](https://upload.wikimedia.org/wikipedia/commons/c/c6/Thin_clients.png)

# Virtual Private Network (VPN)

## 虚拟专用网络

- Remote access 远程获取
- Enables sharing as if connected to a private network 启用共享就像连接到专用网络

# Internet VPN



Source: Wikimedia Commons ([CC BY-SA 4.0](https://commons.wikimedia.org/wiki/File:Virtual_Private_Network_overview.svg))  
[https://commons.wikimedia.org/wiki/File:Virtual\\_Private\\_Network\\_overview.svg](https://commons.wikimedia.org/wiki/File:Virtual_Private_Network_overview.svg)

# ICANN

## 互联网名称与数字地址分配机构

### (Internet Corporation for Assigned Names and Numbers)

- Organisation for Internet 互联网机构
- Created 1998 创建于1998年
- Domain Name System – DNS 域名系统
  - Internet directory system 互联网目录系统
  - Names sit on top of numbers
- Unique identifiers for the Internet 互联网唯一的标识符
- Top Level Domains – TLDs 顶级域
- Maintains operational stability 维持可操作稳定性

# New developments at ICANN

## ICANN的新发展

- gTLD Programme 通用顶级域项目
  - New Generic Top-Level Domains 通用顶级域
  - Non-Latin character set 非拉丁字符集
- Further developments 进一步发展
  - Chinese (Han)
  - Japanese
  - Korean

# ICANN New Generic Top-Level Domains

## ICANN新通用顶级域

- <https://newgtlds.icann.org/en/>
- About ICANN New gTLDs 关于ICANN通用顶级域  
<https://newgtlds.icann.org/en/about/program>

# World Wide Web (WWW)

## 万维网

- The Web is an application that runs on the Internet  
网络是一个运行在互联网上的应用
- Documents encoded in HTML  
以HTML编码的文档
- Identified by URLs (web address)  
被URLs识别（网络地址）
- Rendered by browser software  
由浏览器呈现
- Connected by hypertext links  
超文本链接连接

# Tim Berners-Lee: inventor of the WorldWideWeb (WWW) 万维网发明者 1990 while working at CERN in Switzerland



Web Inventor and Founding Director of the World  
Wide Web Foundation



# How do we get from Tim Berners-Lee's first web server to what we have now?

- Image of current ICANN webpage



Source Wikimedia commons ([CC BY-SA 3.0](https://commons.wikimedia.org/wiki/File:First_Web_Server.jpg)):  
[https://commons.wikimedia.org/wiki/File:First\\_Web\\_Server.jpg](https://commons.wikimedia.org/wiki/File:First_Web_Server.jpg)

## Tim Berners-Lee at CERN

"It would be so much easier if everybody asking me questions all the time could just read my database"

"如果向我提问的人可以直接阅读我的数据库那将会容易得多"



Source ([CC BY 2.0](#)):

<https://www.flickr.com/photos/itupictures/16662336315>

Wright, R.. "The Man Who Invented the Web: Tim Berners-Lee Started a Revolution, But it Didn't Go Exactly as Planned." *Time*, May 19, 1997. (64-69).

# HTML - Hyper Text Markup Language

## 超文本标记语言

- ENQUIRE – prototype system internal to CERN  
询问计划-CERN内部的原型系统
- Extend SGML to include hypertext  
扩展SGML用以包含超文本
- HTML tags (18 elements) HTML标签 (18个元素)
- Hypertext: 超文本
  - Allows user to jump to other text or images  
允许用户从当前位置直接切换到文本或图片
  - Allows reading (or processing) in a non-linear manner  
允许非线性式的阅读或处理

# Tim B-L's original World Wide Web browser in 1993

1993年最初的万维网浏览器

- Image of Tim Berners-Lee's original WorldWideWeb browser in 1993
- <http://info.cern.ch/NextBrowser1.html>

## What did he do with it? 他用之做了什么？

- And what have we done with it?  
我们用之做了什么？
- What has it become?
  - 后来如何发展？

Mosaic browser launched in 1993; first browser to show images

第一个能够显示图片的浏览器

Eventually becomes Netscape.

最终成为网景通信公司

Image of Netscape plaque.

<https://www.technobuffalo.com/2010/01/12/first-version-of-internet-explorer/>

Image of screenshot of Mosaic 1.0

<https://en.wikipedia.org/wiki/File:NCSAMosaic1.0Mac.png>

Mosaic 1.0 (Wikimedia commons)

Image of screenshot of Mosaic 3.0

Mosaic 3.0 (Wikimedia commons)

# Information Geography

## 信息地理

- See the Oxford University website  
参见牛津大学网站
- <http://geography.oii.ox.ac.uk/>

# Internet Population and Penetration

## 互联网人口和渗透

- Oxford Internet Institute 牛津互联网学院  
<http://geography.oii.ox.ac.uk/?page=internet-population-and-penetration>)



# World Wide Web Consortium – W3C

## 万维网联盟

- Founded by Tim Berners-Lee at MIT in 1994
- Develop standards for the web 不断地进行更新
- Education and outreach 教育与延伸
- Oversees publication of HTML versions
- 俯瞰HTML版本的变迁
  - HTML 2.0 - 1995
  - HTML 3.2 – 1997 (January)
  - HTML 4.0 – 1997 (December)
  - XHTML – 2000 (HTML meets XML – less forgiving)
  - HTML5 - 2014

# China and the Internet

## 中国和网络

- Joined Internet intermittently since 1989  
从1989年间歇式的加入互联网
- Permanently since 1994  
1994年永久加入
- Slow to adopt Internet  
慢慢地接受了互联网
- China Internet Network Information Centre CNNIC  
中国互联网络信息中心
- Administration of Internet in China  
中国互联网管理部门

# China and the Internet

## 中国和网络

- Beijing 1987 email so not TCP/IP based  
北京在1987年使用邮件，但不是基于TCP/IP协议的
- 'Across the Great Wall we can reach every corner in the world.'  
越过长城，走向世界  
<https://archive.is/20130101104447/http://big5.chinanews.com.cn:89/special/guoqing/60/2009/06-25/122.shtml>
- 1990 China register top-level domain .cn  
中国的顶级域名 .cn

# China Internet Network Information Centre (CNNIC) 中国互联网络信息中心

- Founded 1997 in Beijing 1997年成立于北京
- Under direction of Ministry of Information Industry  
由国家信息产业部指导
- Domain name registrations 域名注册
- Management of Internet resources 网络资源的管理
- Directory and Information services 工商名录和信息服务
- International communication and cooperation  
国际交流与合作
- Research and development 研发职能

# China and the Web

## 中国和网页

- Rapid growth through 2000's 21世纪飞速发展
- 2008 China largest population Internet users  
2008年中国是互联网用户最多的国家
- 2016 50% China's population have Internet  
2016年50%的中国人口有互联网
- Uneven access 不均衡的使用
  - Most connected: Beijing & Shanghai 最多的：北京&上海
- Most Chinese users connect by smartphone  
大多中国用户通过智能手机连接互联网

## Golden Shield project 金盾工程

- Internet access routes owned by government  
政府所有的网络接入路径
  - at first only through Beijing, Shanghai, Guangzhou  
开始只有北京、上海、广州接入
  - seven new access points added in 2015  
2015年增加七个新的通路点
  - state owned Internet Service Providers  
国有互联网服务供应商

## Golden Shield project 金盾工程

- Most users only access Chinese sites  
大多用户只访问中国网站
  - Language barrier  
语言障碍
- Golden Shield project to control content  
用于控制网络内容的金盾工程
  - Hardware provided mostly by US companies
  - Great Firewall of China 中国的大防火墙

# Submarine Cable Map 2016

## 2016全球海底光缆分布图

- A global map of the submarine Internet cables across the world. This shows the access points to all the continents.  
全球海底光缆的分布图；展示了所有大陆的接入点
- <http://submarine-cable-map-2016.telegeography.com/>