
# 목 차

- AVVID
- CDN
- WLAN

# 차세대 네트워크 기술

Data/Voice/Video

Optical

Wireless

Intelligent Software

Advanced Hardware

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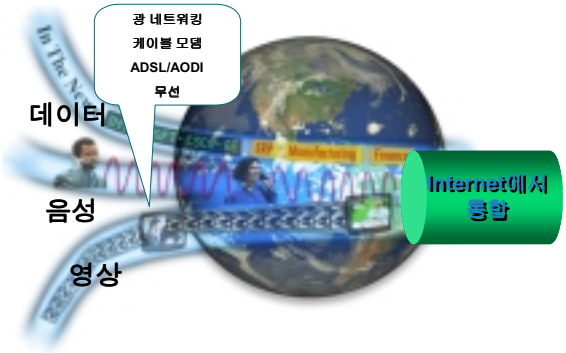
3

# 통신 기술의 통합 흐름 (Voice /Video/Data 의 IP로의 통합)

- 데이터 네트워크와 음성 네트워크가 통합되는 단일한 네트워크
  - 여러가지 다양한 네트워크 인프라에서 패킷으로 트래픽이 통합
  - 통합의 매개체는 인터넷
- 음성 트래픽 보다 데이타 트래픽이 압도적으로 많은 환경
- 다양한 현재 데이터 전산환경의 다양한 어플리케이션과 통합
  - Unified Messaging
  - CTI, Call Center
- 새로운 형태의 다양한 비즈니스 기회
  - 전화와 데이타의 통합에 따른 다양한 부가 서비스 창출
- 언제 어디서나 데이타와 음성을 간편하게 사용
- 데이터는 요금 부과, 음성은 무료화가 가능

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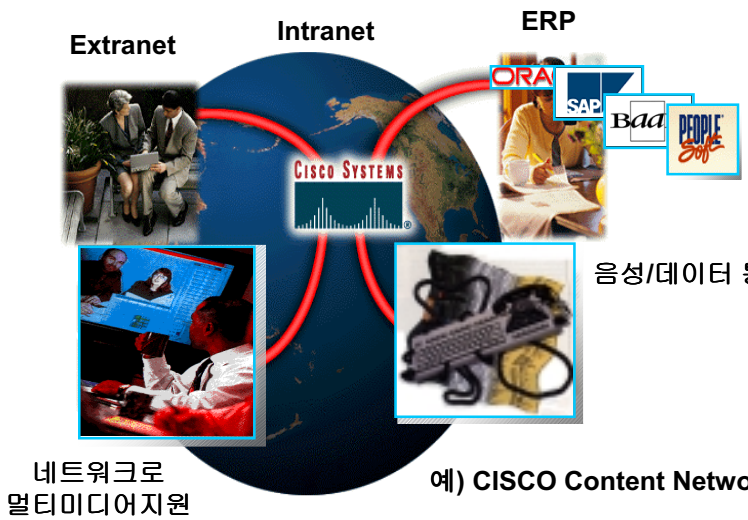
## 어플리케이션과 통합된 네트워킹






## Internetworking 에서 Content Networking으로의 전환

| Internetworking | Content Networking |
| --- | --- |
| Reaching a destination (L3) | Accessing Content (L7) from the most responsive source |
| Static Host names / addresses | Dynamic Web pages/URLs |
| Policies for network device management | Policies for content caching, load balancing, application recognition |

## Mobile Network 혁명

- By 2002 over half of all call minutes will be on mobile networks IDC
- New Standards will encourage Mobile Data (2005 - $80B)
- Mobile internet deployed now

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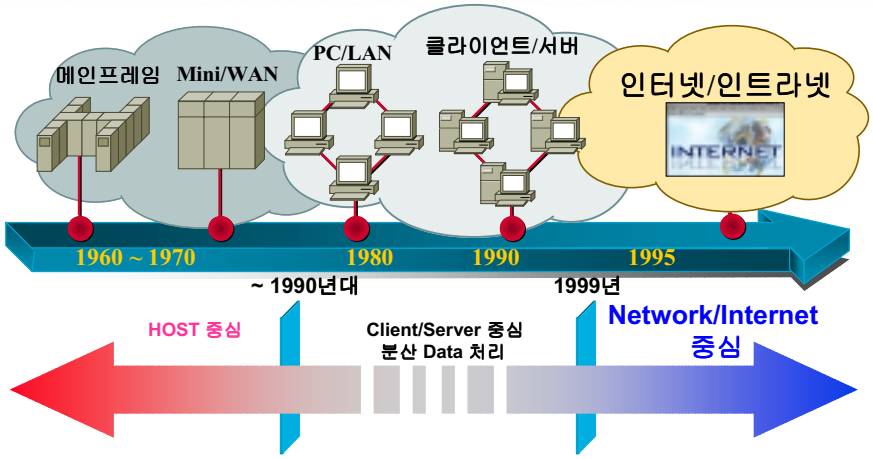
7

## CDN
## (Contents Delivery Network)

Cisco Systems

8

# 전산환경의 변화




1999~ : 글로벌 인터네트워킹 시대, 새로운 세상 (New World,IP World)

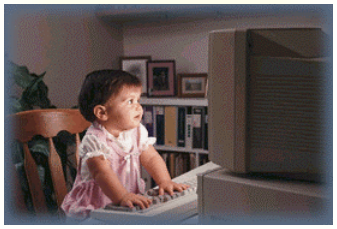




# Network시대의 환경변화

1

Internet 세대



2

풍부한 Content 와
광대역 Access

3

***Drive need for scalable Content Delivery and New Hosting Services***

# Application의 네트워크 요구사항

지난 5 년간 . . .

Network enabling of relatively simple applications

향후 5년 . . .

Enabling more demanding networked applications
*e-Learning, e-Commerce, e-Communication*

**Key strategic applications will require . . .**

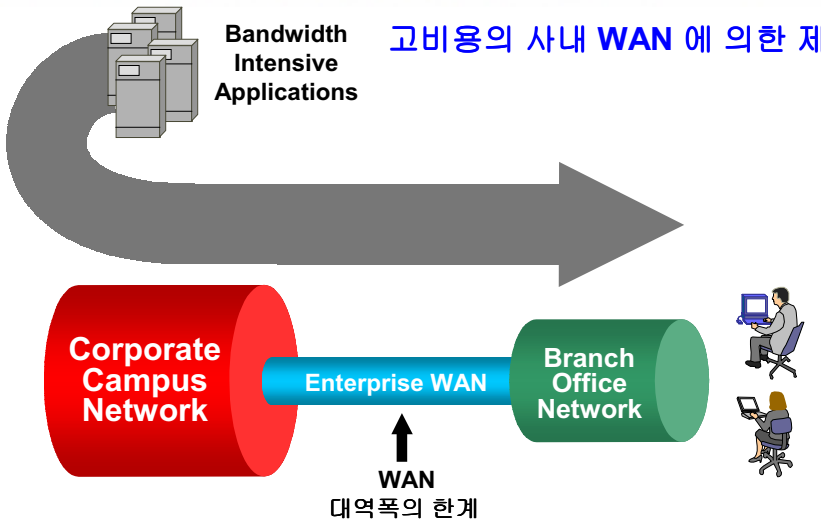
Higher Bandwidth

Higher Reliability

Better response times

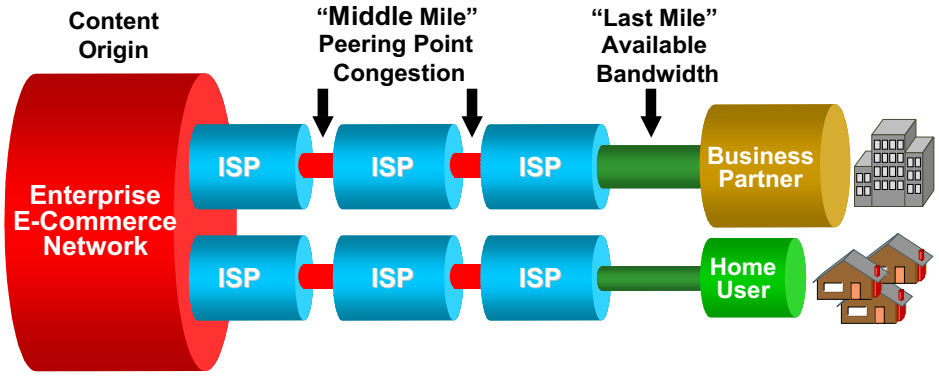



# 기업내부 네트워크 제약



# 기업외부 네트워크 제약

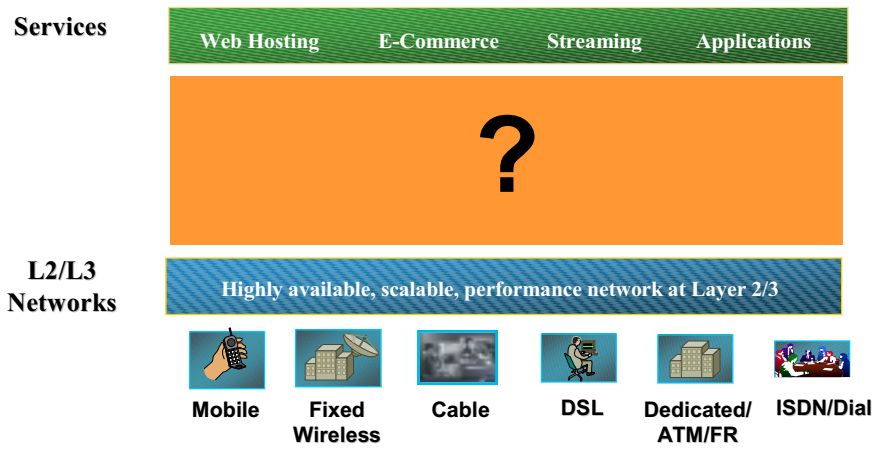
**Internet상의 병목에 의한**
**E-Business application 제약**



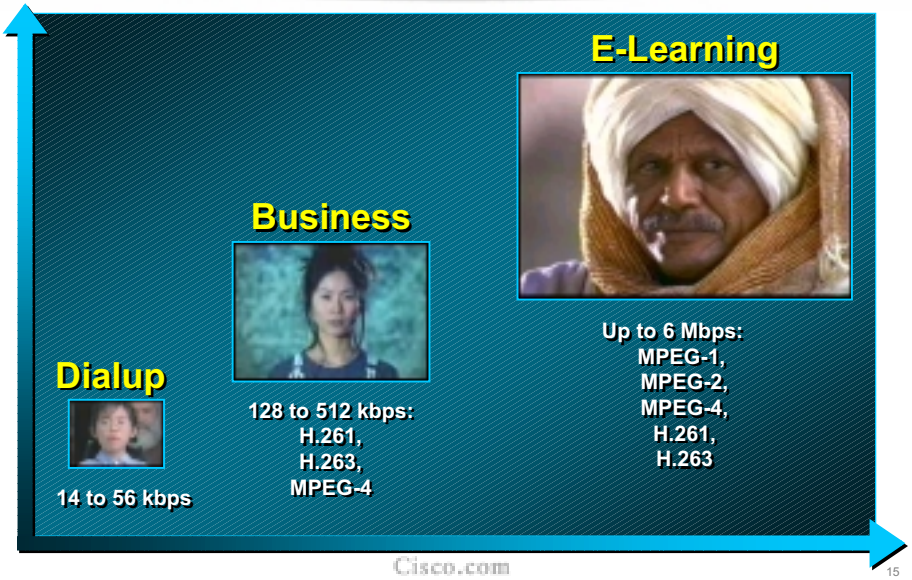




# Internet Business 구성 모델



## E-Learning을 위한 Network 대여폭

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## CDN(Content Delivery Network) 정의

**An end-to-end content delivery system leveraging services in the IP core network and content aware layer 4 - 7 capabilities to optimize end user access to content.**

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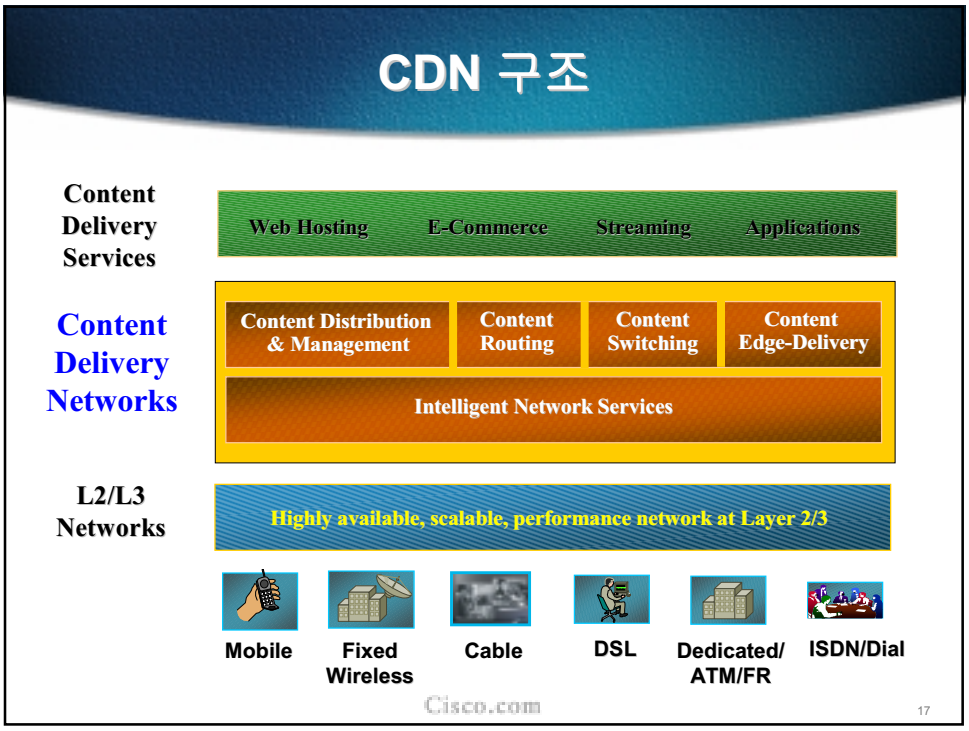
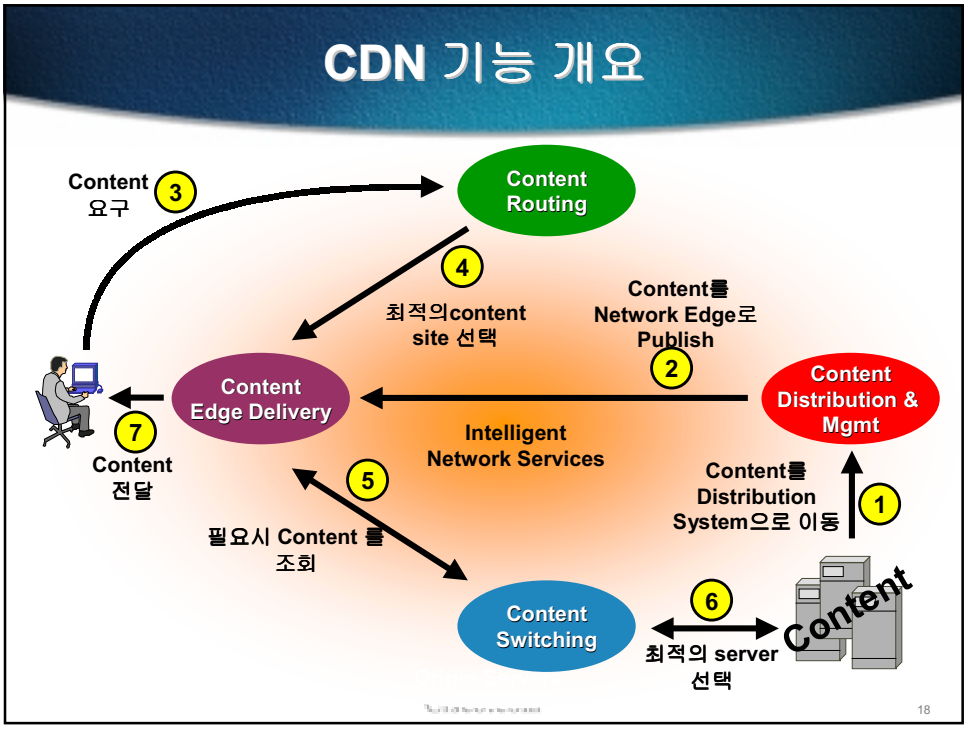
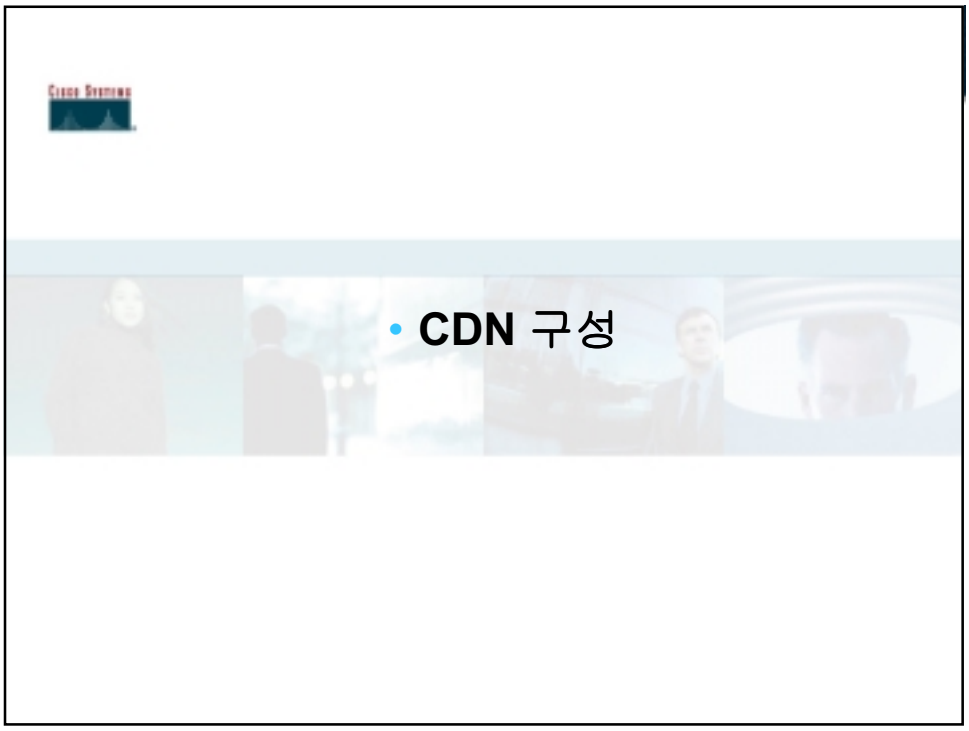
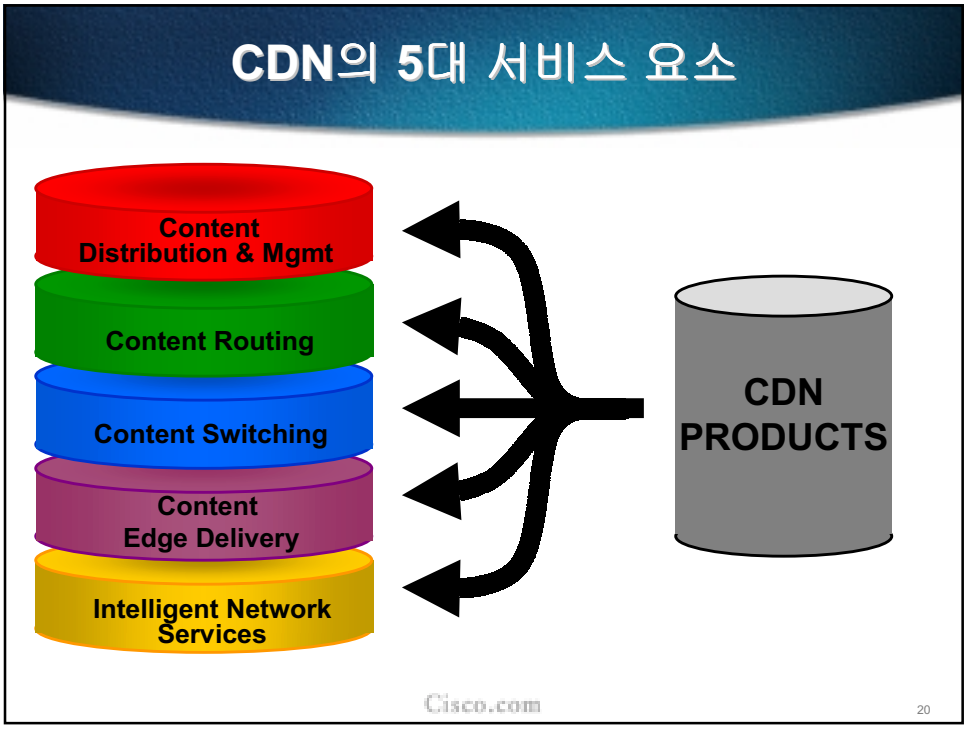
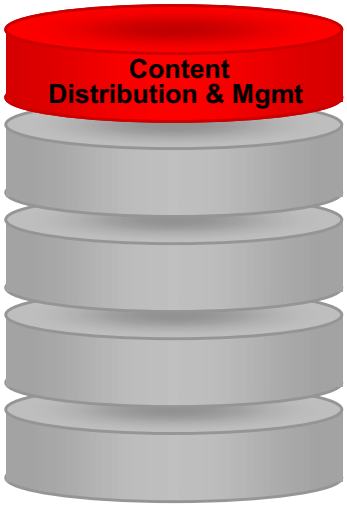




# CDN의 5대 서비스 요소
## *Content Distribution & Mgmt*




- Global centralized provisioning for content distribution
- Automatically distribute content to network edge
- Management service for CDN monitoring
- Configuration management for delivery nodes at network edges

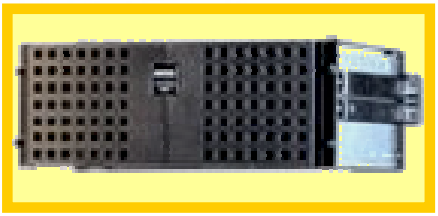



# Content Distribution Managers 제품

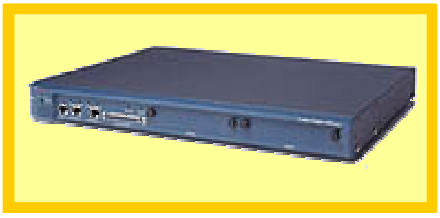
CDM

**CDM 4600 Series:**

- Management for CDN
- CDN policy & configuration database
- Content, customer registration & domain assignment
- CDN Network monitoring
- CDN Accounting interface
- Enterprise content registry
- Peering/Billing (Future)

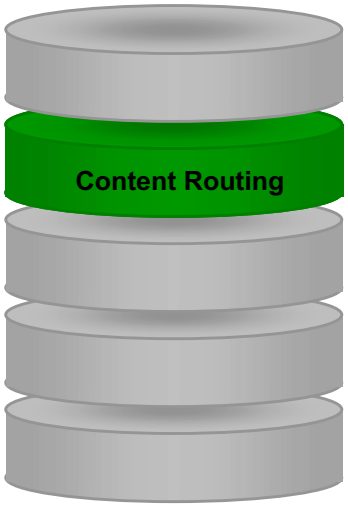


CDM 4650 / 4670



CDM 4630

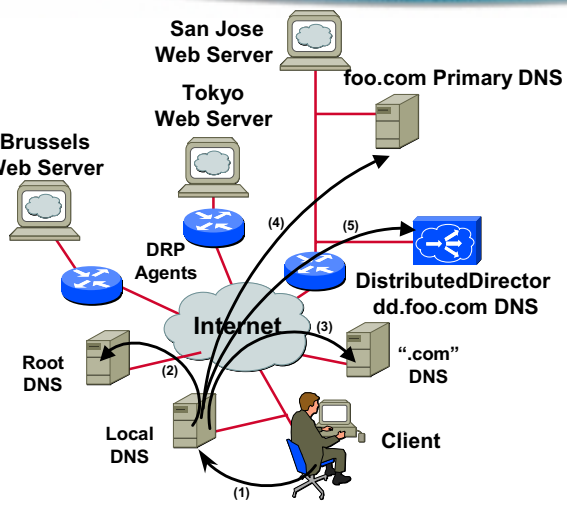
# CDN의 5대 서비스 요소
## *Content Routing*




- Best Site Selection process
- Redirects or Routes requests from users to the best site
- Best site selection metrics include:
  - presence of content
  - geographic proximity
  - network conditions
  - Site load and Server load




# DistributedDirector 조회 순서




**Step**

**(1) Client asks local DNS "What is the IP address of www.foo.com?"**

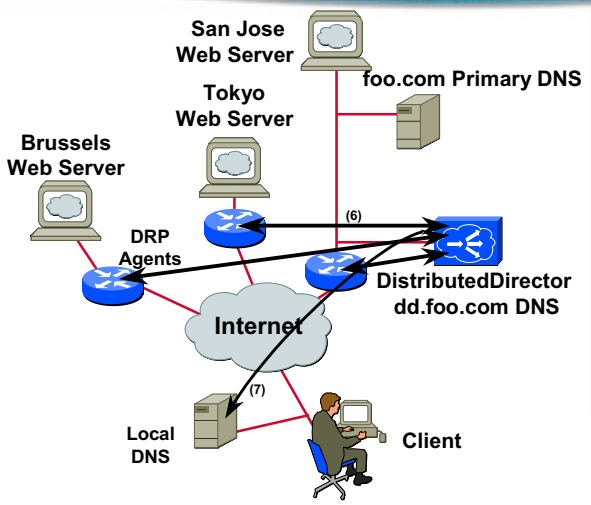
**(2) Local DNS queries "Root" DNS server for www.foo.com's IP Address.
Root DNS refers local DNS to ".com" DNS server**

**(3) Local DNS queries ".com" DNS server for www.foo.com's .
".com" DNS refers local DNS to "foo.com" DNS server**

**(4) Local DNS queries "foo.com" DNS server for www.foo.com's.
"foo.com" DNS refers local DNS to DistributedDirector**

**(5) Local DNS sends query to DD (dd.foo.com is authoritative nameserver for www.foo.com subdomain)**

# DistributedDirector 조회 순서




**Step**

(6) DD "knows" IP addresses of servers and DRP Agents

DD issues DRP queries to agents to gather required metric information

DRP Agents respond

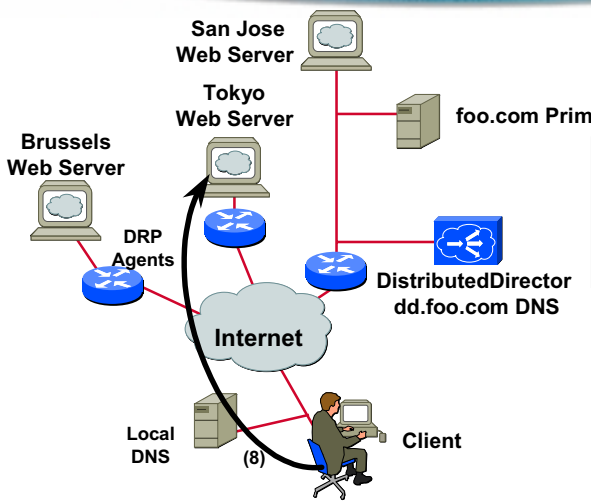
"Distance" is from DRP Agent/distributed servers to local DNS

(7) DD sorts metrics and returns single IP address of "best"server to client's local DNS

Local DNS returns IP address to client



# DistributedDirector 조회 순서




**Step (8)**

Client connects to server at returned IP address

# Content Routing 제품

CR

- **DistributedDirector Server Algorithm**
  - Routing based on routing metrics
  - NS records support for hierarchical routing
  - BGP Route maps (policy)
  - Dynamic Feedback Protocol for LD/DD interaction
- **Boomerang Server Algorithm**
  - DNS 'Triangulation' Algorithm
  - Transparent Server Selection
  - Server health check w/ HTTP GET

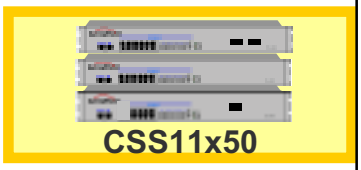




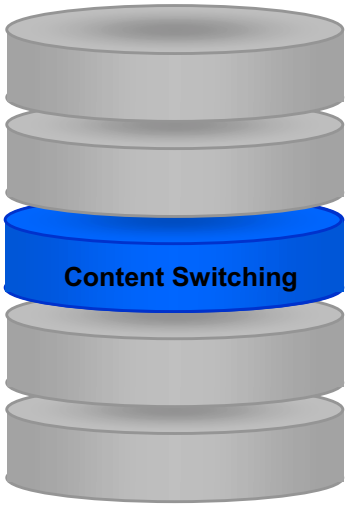
# Content Routing 제품

CR

- **SightPath SODA Server Algorithm**
  - Routes requests to optimal content engine
  - Scales to >1K nodes
  - DNS hierarchical routing mechanism based on Sightpath SODA architecture
  - Dynamically adapts to changing network conditions (learning)
- **CAPP Server Algorithm * Pre Web-NS 4.0 ***
  - Demand based content replication – "hot content"
  - Staged Content Replication based in Content Rules
- **Web-NS 4.0 Tiered Proximity Algorithm**
  - Routing based on Proximity
  - Best Site – Best Server Selection Coupled
  - Hierarchical architecture – multiple tiers
  - NS records support for hierarchical routing

# CDN의 5대 서비스 요소
## *Content Switching*




- Best Server or Content Engine Selection
- Intelligently load balances traffic across servers or Content Engines
- Gracefully removes ‘problem’ servers from the rotation
- Automatically inserts “well-behaved” server to the rotation
- Selection is based on:
  - Server Availability
  - Server Load
  - Server Response Time
  - Content Availability
  - L3/L4 information (IP address, TCP port, …)
  - L5-L7 content (URL, Cookie, ...)

*–(Note that HTTP is an L5 protocol/application, NOT L7)*




# Content Switching
## *L4 와 L5-L7*

- **L4 Content Switching Capabilities**
  - Protocol
  - TCP/UDP Port
  - Stateful & Stateless Failover
  - SLB Algorithms
  - SLB NAT/PAT
- **Application Probes**
  - HTTP Probes
- **Catalyst 6000, 4840G, IOS-SLB**

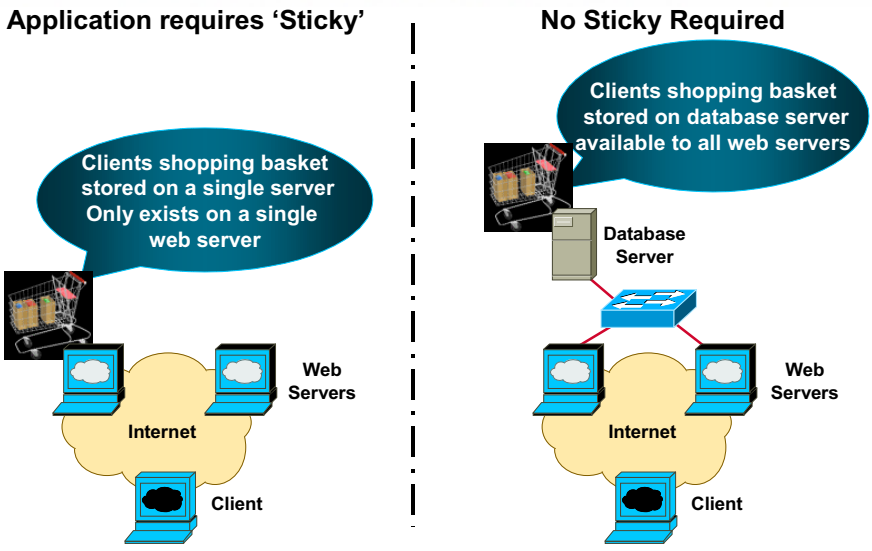
- **L5-L7 Content Switching Capabilities**
  - HTTP Host Tag
  - Entire URL
  - Dynamic Cookie
  - File Extensions
  - + ALL capabilities of L4!
- **Persistence Features**
  - Source IP, SSL, Cookie Insert, Cookie Passive, HTTP Redirection
- **Content Switching Policies**
  - User configurable Content Rules
  - Broad Range of Services Per Content Rules
  - Content Verification System
- **CSS 11050, 11150, 11800, LD**

# General Load Balancing Algorithms

- Round Robin
- Weighted Round Robin
- Least Connections
- ACA
- Weighted ACA




# Sticky Connection의 필요



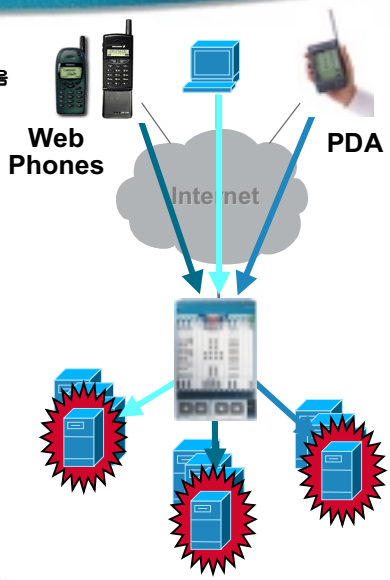
## Cisco CSS 제품군 DoS Attack 방어 기능

- SYN Flood
- Illegal Addresses
- Illegal Ports
- NAT
- LAND Attack
- Smurf and Fraggle
- Teardrop, Ping of Death, Boink, Bonk
- DoS Logging- CSS, Syslog, SNMP Trap




## 단말 환경에 따른 Web Services 기능지원

•다양한 단말 Type에 따라 서버 그룹지정을 다르게 할 수 있음
•단말 type 외에 사용언어등 다양한 HTTP Header 내용에 따라 서버를 지정 할 수 있음




단말 Type 에 따른 예

Step 1: Web Browser requests URL: www.yahoo.com/myportfolio

Step 2: Internet phone requests URL: www.yahoo.com/myportfolio

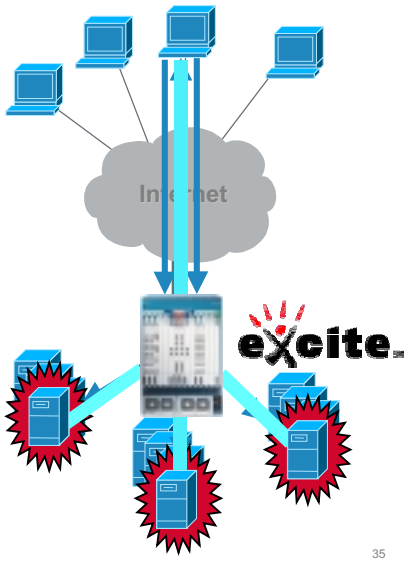
Step 3: PDA requests URL: www.yahoo.com/myportfolio

Step 4: Switch determines best server for each request based on browser type or language support in HTTP request header

Step 5: Switch delivers requested content to each device

# HTTP 1.1 기능 지원

•HTTP 1.1의 기능인 여러 개의 동시Request를 각각의 서버에 분산 하여 서비스제공을 받을 수 있는 기능




Step 1: User clicks: www.excite.com/cars
Browser gets IP Address from DNS
Browser sends TCP SYN (connect?)

Step 2: Switch sends TCP SYN ACK

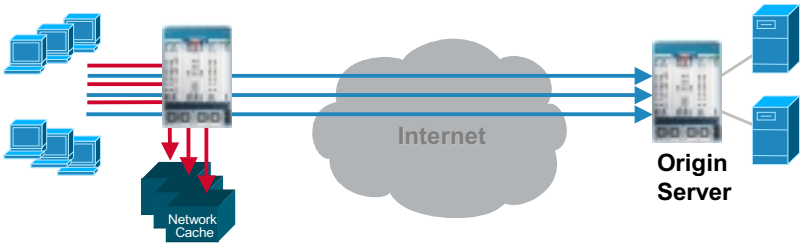
Step 3: Browser sends URLs:
www.excite.com/main
www.excite.com/picture1
www.excite.com/banner2
www.excite.com/text4

Step 4: Switch determines best server for each request

Step 5: Switch aggregates responses in a single TCP connection

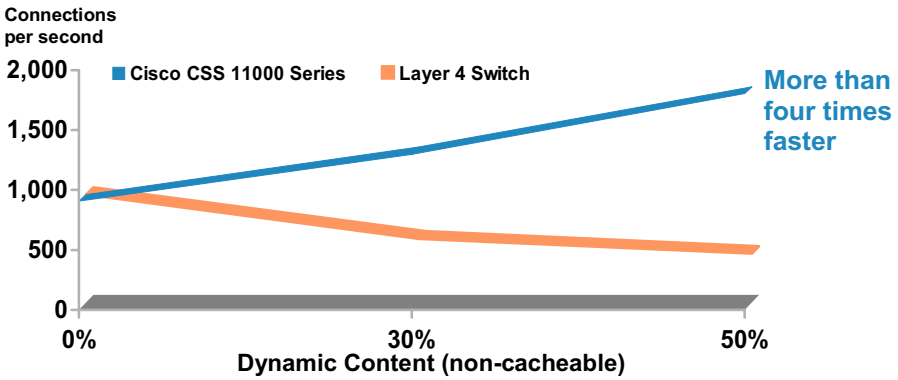



# 지능형 Cache Bypass 기능




- URL, file type별로 Cache기능이 필요없는 Content에 대하여 Cache로의 흐름을 Bypass하여 전체 성능 향상을 도와 주는 기능
- Transparent - no browser configuration required
- Improves performance by bypassing cache for non-cacheable content or cache failures
- Content policy allows include, exclude (bypass), or block actions based on Access Control Lists
  Based on IP address, TCP port or URL

# 지능형 Cache Bypass 성능

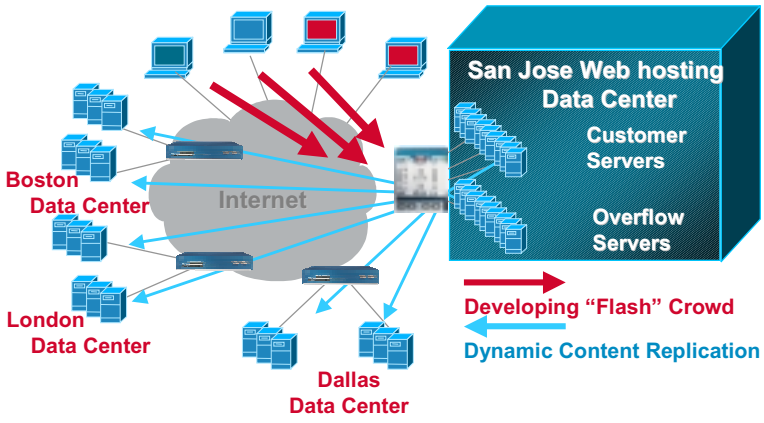



Dynamic Content가 증가할 경우 일반 Cache 지원구조에서는 성능이 저하되지만, CSS경우 전체 성능이 개선됨





# Flash Crowd Insurance




WEB Request폭주시 임시로 Content를 다른 서버에 복제하여 한시적으로 서버 용량을 확대하여 서비스 제공을 지원할 수 있는 기능

# Content Switching제품 (L4-L7)

## *CSS 11000 Family*


- **CS-11800**
  - 20 Gbps 8 Slot Modular Chassis
  - RPS
  - Up to 64 10/100 or 32 Gigabit Ethernet ports
  - NEBS1 Compliant

- **CS-11150**
  - 1 RU Fixed Configuration 5 Gbps Switch
  - Up to 16 10/100 & 2 Gigabit Ethernet ports
  - RISC Based Processor
  - 128 MB SDRAM

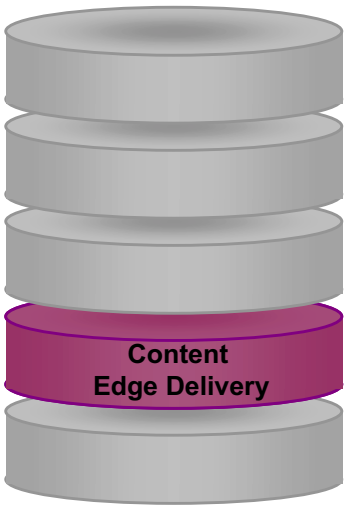
- **CS-11050**
  - 1 RU Fixed configuration 5 Gbps Switch
  - Up to 8 10/100 & 1 Gigabit Ethernet ports
  - RISC based processor
  - 128MB SDRAM





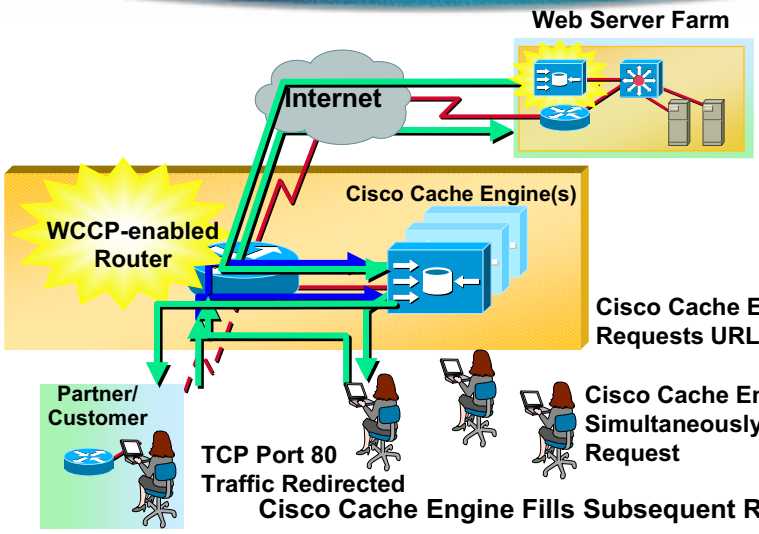
# CDN의 5대 서비스 요소

## *Content Edge Delivery*




- Provide content serving transparently to the user
- Content Edge-delivery Redundancy & Scalability
- Content Serving through:
- Transparent caching
- Reverse-proxy caching
- Streaming Media Service
- Content Serving of:
  - -Static files
  - -Real G2
  - -MPEG 1 & 2 support

# Cisco Cache Engine 운영방식







# Caching 종류

- **Proxy Caching**
  - Client's browser is configured to send all requests to the cache
  - Cache acts (proxies) on behalf of the client
- **Transparent Caching**
  - Cache is transparent to the client's browser
  - Cache is strategically placed in the path of network traffic where all the traffic is guaranteed to pass
  - Intercepts TCP port 80 requests
- **Reverse Proxy Caching**
  - Cache acts (proxies) on behalf of the origin server
  - DNS requests are resolved to an RPC
  - RPC's cache specific content
  - RPC's Can serve the following functions:

    Offloading of static (cacheable) content from servers

    Replication of content to geographically dispersed areas

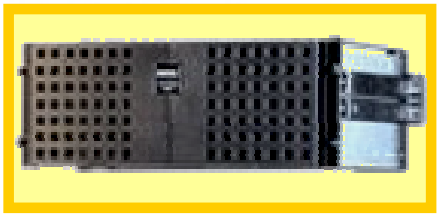
    Replication of content for load balancing, and as an alternative to server expansion

# Content Engine 제품

CE

**Content Engine 7320:**

- Service Provider & Large Enterprise Deployment
- Caches Enabled Content
- Populated via Pull or Push
- Serves Requested Content



CE 7300 Series

**Content Engine 500 Series:**

- Enterprise Deployment
- Transparent caching & content delivery software modules
- Static files, Real G2, MPEG 1 & 2 support

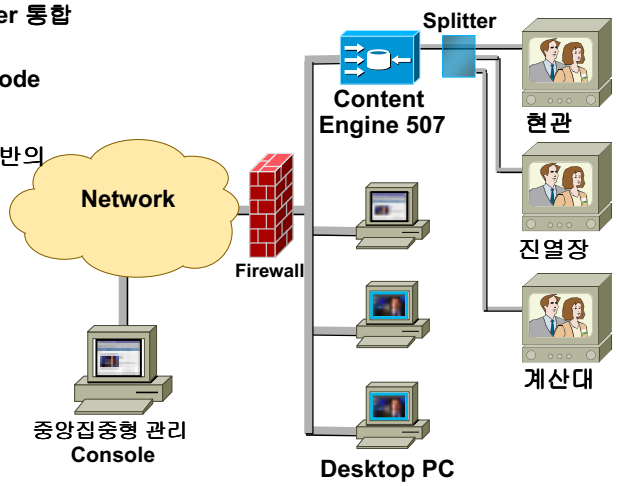
CE 507 / 560 / 590



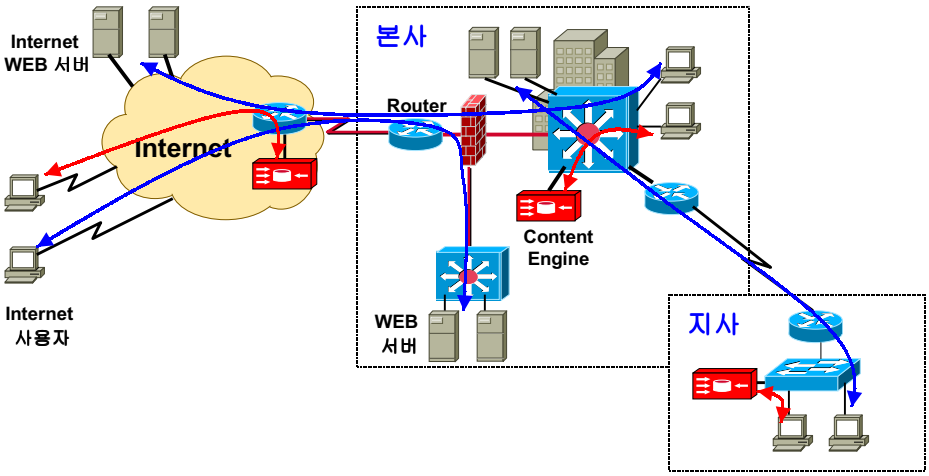


# CDN솔루션 (예)
# NTSC 또는 PAL 영상 출력 솔루션

- CE에 MPEG decoder 통합
- Media Files을 Video/Audio로 Decode
- NTSC 와 PAL 지원
- 중앙집중형 Web 기반의 VTR/VCR 제어
- 적용
  - Kiosk
  - Video Wall
  - Point-of-Sale



## Content Engine을 이용한 회선비용 절감

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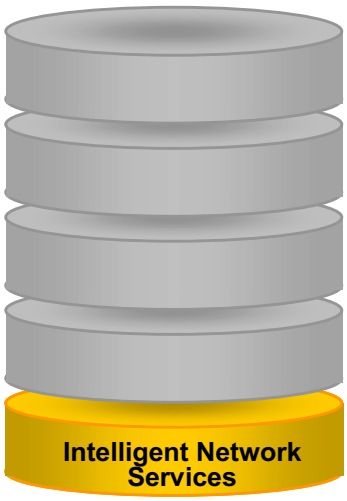
## CDN의 5대 서비스 요소
### *Intelligent Network Services*




- Intelligence within the Cisco IP infrastructure
- Required to build reliable and scalable Cisco CDNs
- A solid layer 2/3 core Cisco infrastructure is a key requirement
- Examples of Cisco's intelligent network services include QoS, (QDM and NBAR), VPNs, Security, and Multicast

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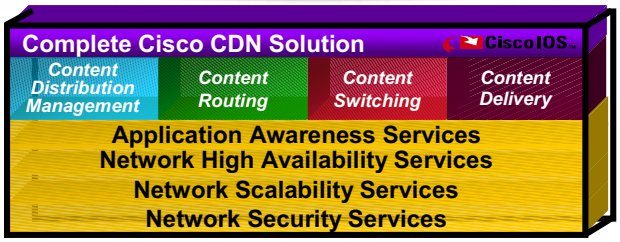
# Intelligent Networking Services




- **QoS & VPNs**
  - –QoS policing, QoS marking, ToS, DSCP, 802.1q, NBAR
- **Security**
  - –State-full inspection Firewalls
  - –IOS Firewall Feature set
  - –ACLs, Extended ACLs and Wire-Speed RACLs & VACLs
  - –Intrusion Detection
- **Multicast**
- **L2/L3 Features**
  - –STP Enhancements: UplinkFast, BackboneFast, PortFast, BPDU Guard
  - –Private VLANs,
  - –Fast Convergent IGPs and Reliable Proven code: IOS

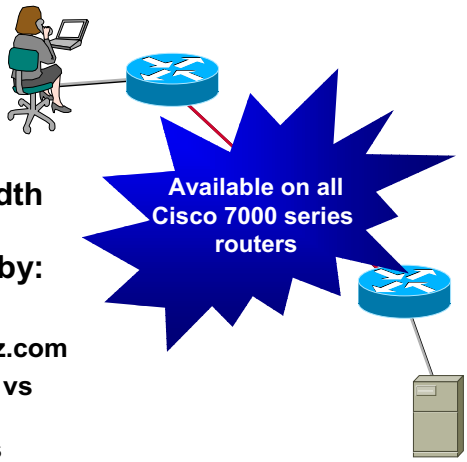




# Contents를 위한 네트워크 QoS 서비스

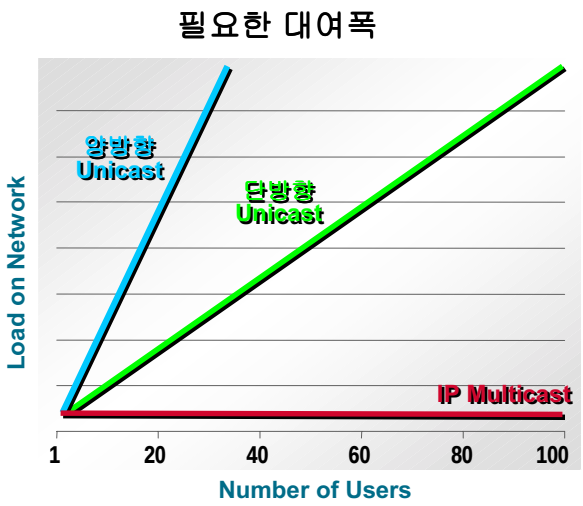
## Network-Based Application Recognition (NBAR)

- **Problem: How to classify modern web-based and client/ server applications**
- **NBAR enhances bandwidth management, providing intelligent classification by:**
  - **URL (wildcards)**
  - **www.cisco.com vs www.xyz.com**
  - **www.cisco.com/orders.htm vs www.cisco.com/faq.htm**
  - **Dynamically assigned ports**



## Video 서비스를 위한 Network 대여폭 산정

- Videoconferencing
  - 양방향 Unicast
- Video-on-Demand
  - 단방향 Unicast
- Broadcast
  - IP Multicast

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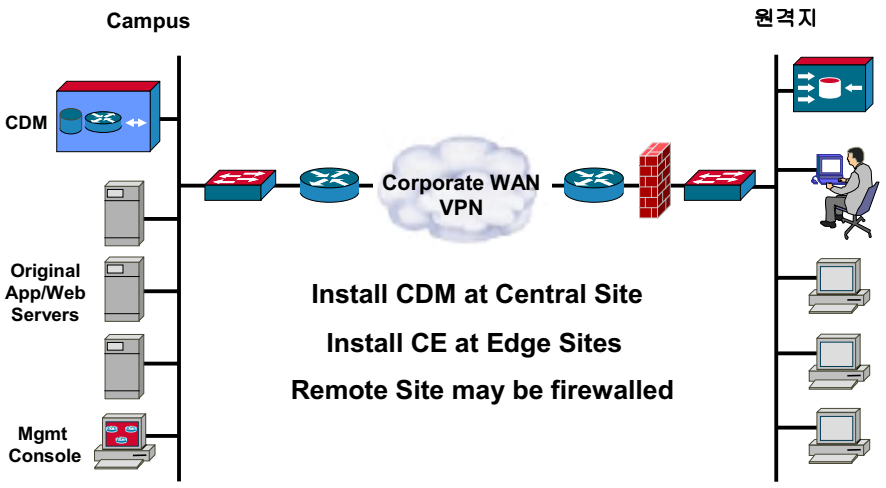
49

## CDN을 적용한 멀티미디어 업무
## Step 1. CDN Setup




Install CDM at Central Site

Install CE at Edge Sites

Remote Site may be firewalled

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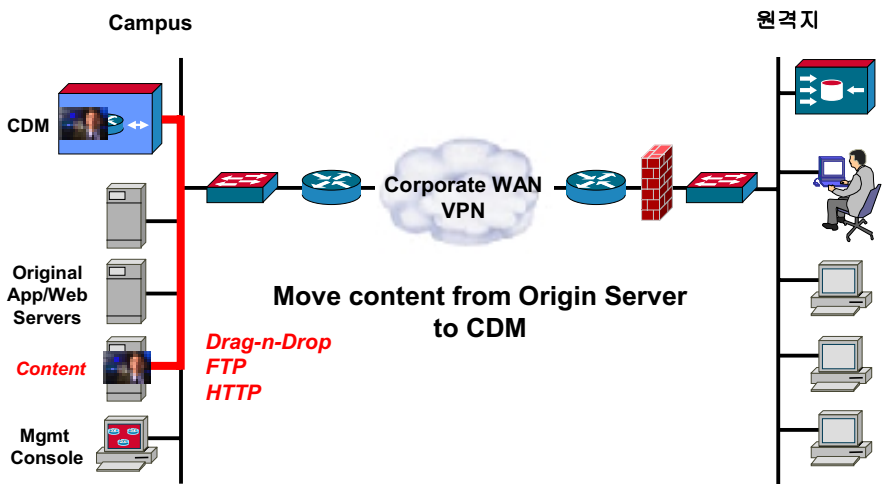
50

# CDN을 적용한 멀티미디어 업무
## Step 2. Import Media

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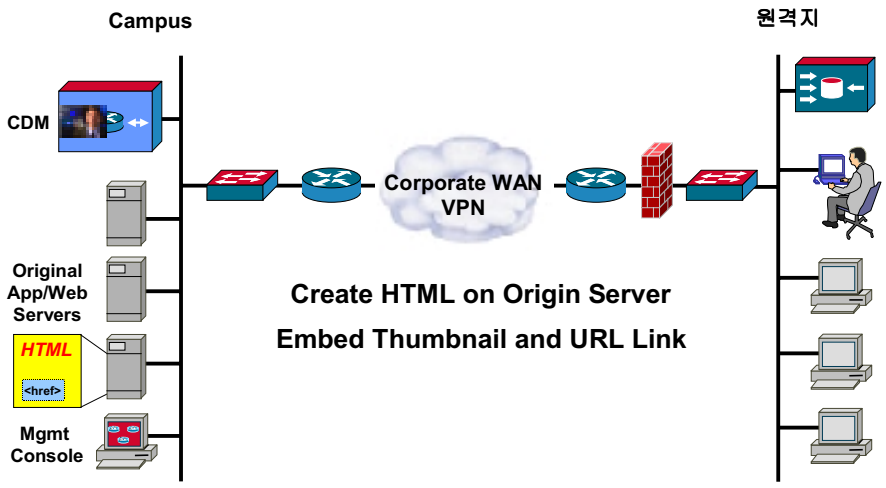
# CDN을 적용한 멀티미디어 업무
## Step 3. HTML Modification

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## CDN을 적용한 멀티미디어 업무
### Step 4. Content Replication


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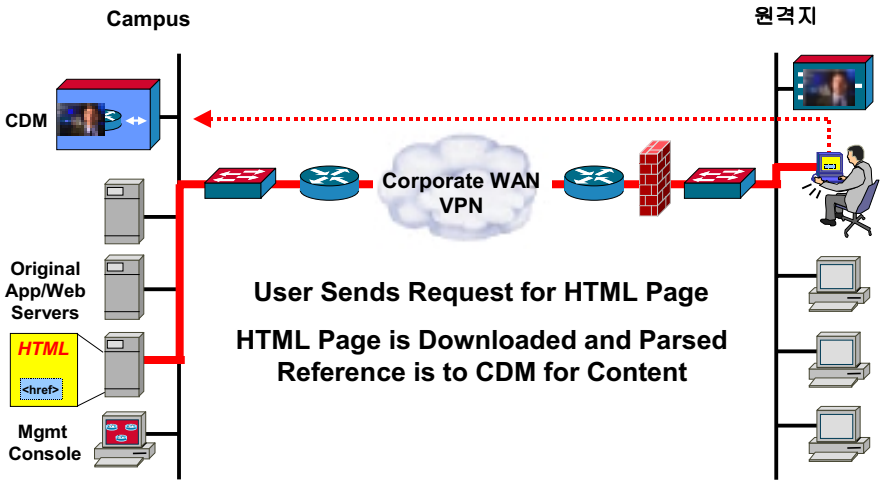
## CDN을 적용한 멀티미디어 업무
### Step 5. User Sends Request

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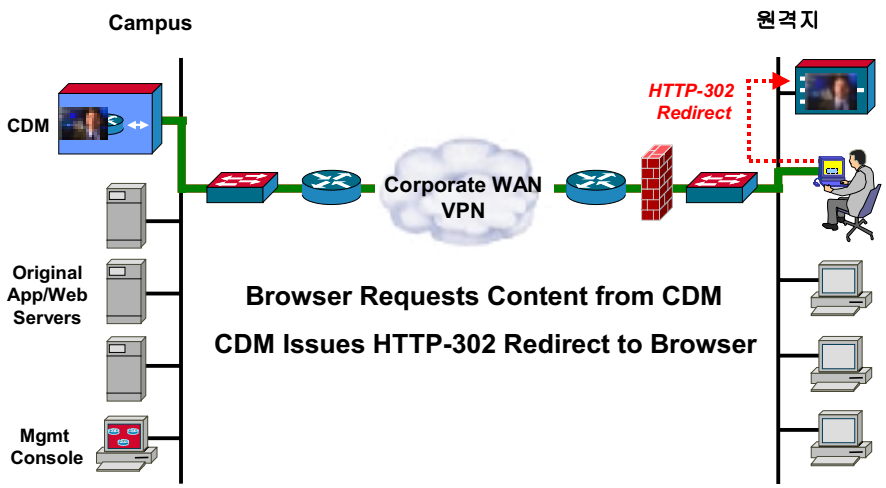
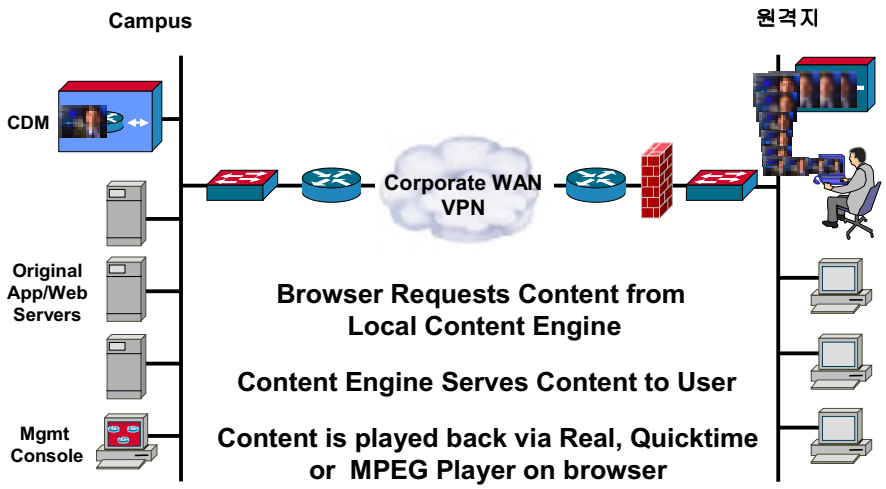
## CDN을 적용한 멀티미디어 업무
### Step 6. Redirection to Content







## CDN을 적용한 멀티미디어 업무
### Step 7. Media Playback



## Cisco의 Content Delivery Network

- ***One Architecture*** **for highly available, scalable, flexible content delivery/services:**
  - Server load balancing
  - Caching
  - Content delivery
  - Live streaming media
- **Easy to use and administer**
- **Fast, secure, assured delivery of content**
- **Low cost of ownership/fast ROI**

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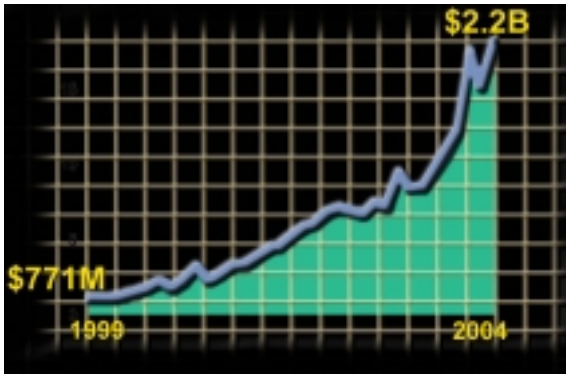
# WLAN Market Growth

- Higher speeds
- Interoperability
- Lower prices

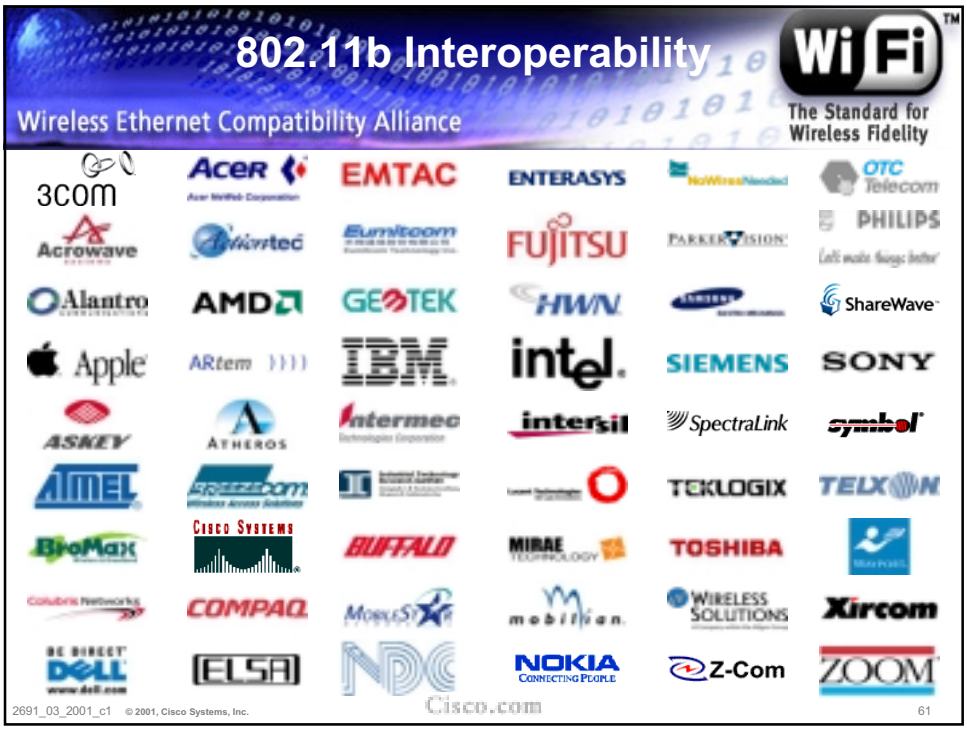


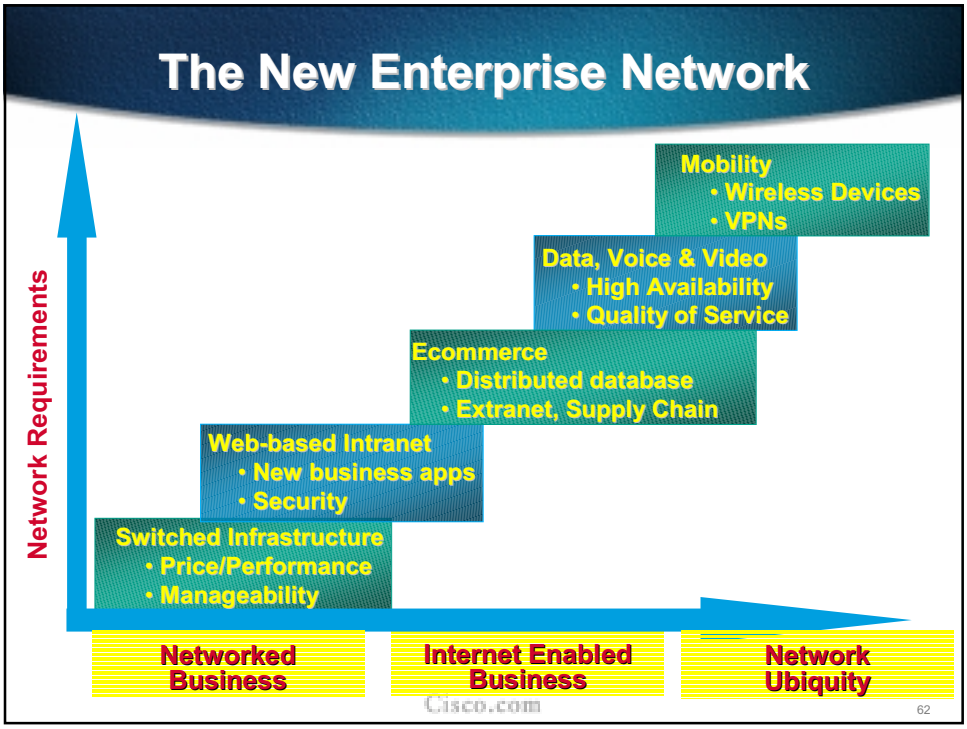

Source: Cahners In-Stat Group, February 2000



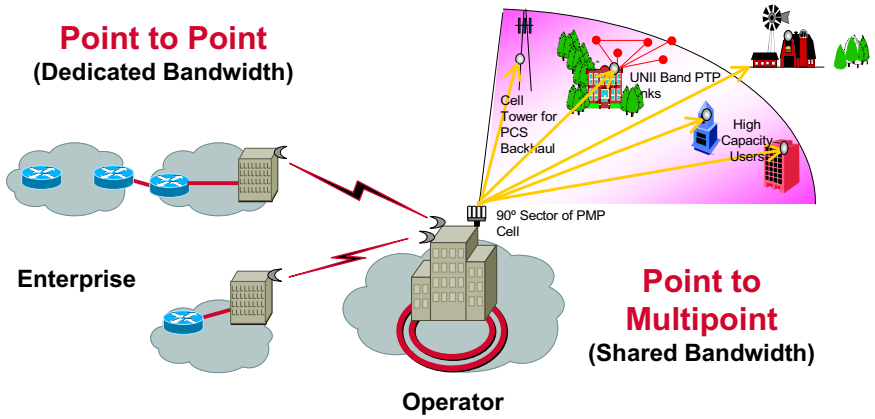
# Key Market Drivers

- **Standardization**
  - IEEE 802.11b standards
- **Technological maturity**
  - Better security—128-bit encryption
  - Longer range access points
  - 11Mbps throughput speeds
- **Horizontal applications**
  - Extension of wired solutions
  - Connecting mobile workers



# Broadband Fixed Wireless

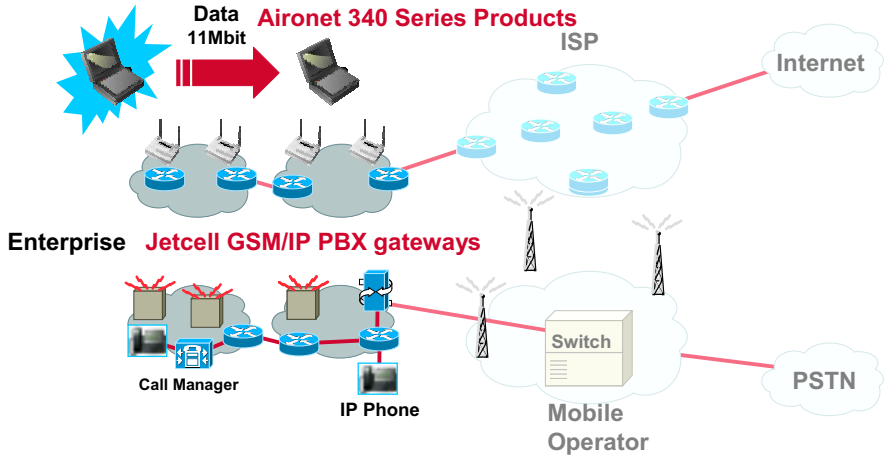



uBR 7200 router family with wt2700 radio interface



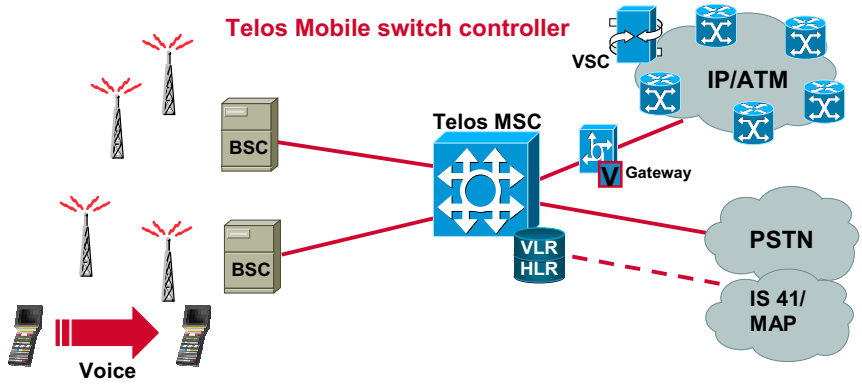


# Wireless Office
## Data and Voice




- High speed data (WLAN 802.11) for business & campus
- Wireless voice (VoIP) & data for in-building

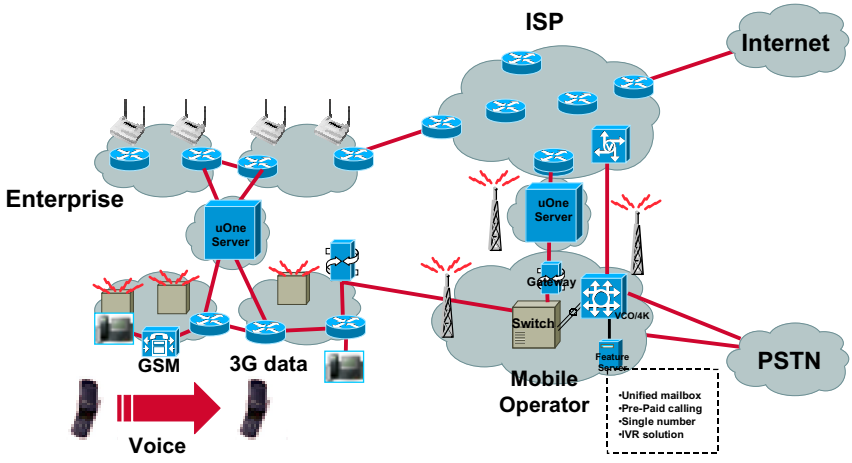
# Mobile Wireless TDM Voice




- Scaleable GSM/CDMA/IS 136 solution for today's network




# Wireless Unified Communications Vision




- Multiple deployment options for multiple class of users

# 무선 **LAN** 기술 소개




## What Are Wireless LANs?

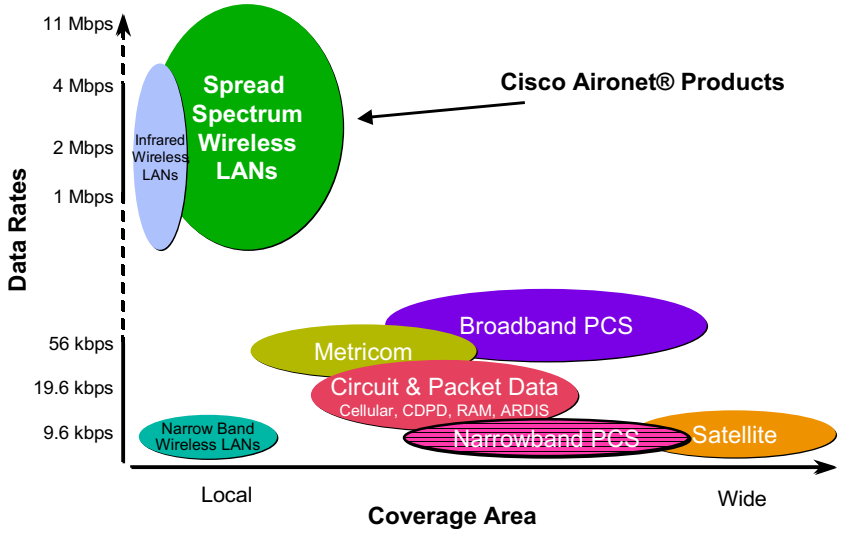
**They are:**

- Local
- In-building or campus area coverage for mobile users
- Up to several miles for point-to-point (LAN to LAN)
- Radio or infrared
- FCC licenses not required
- Customer owns the equipment (no usage charges)

**They are not:**

- Wide area
- Cellular phones
- Pagers
- Packet Data
  - Ardis
  - CDPD
  - RAM Mobile Data
- PCS

# Overview of Wireless Data Network Offerings

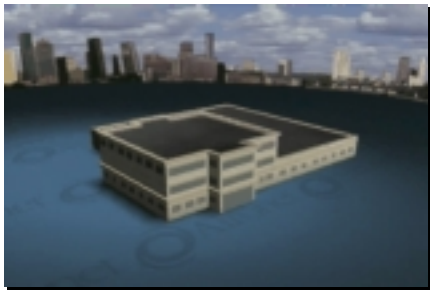


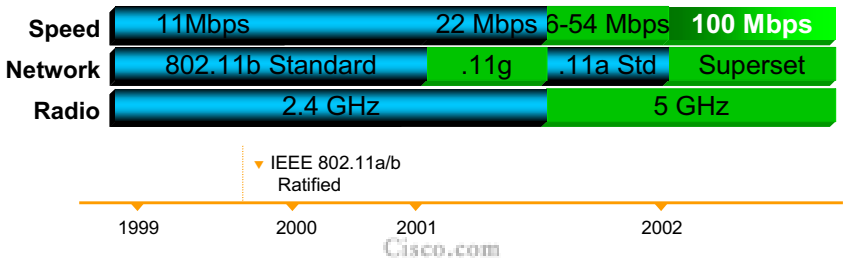




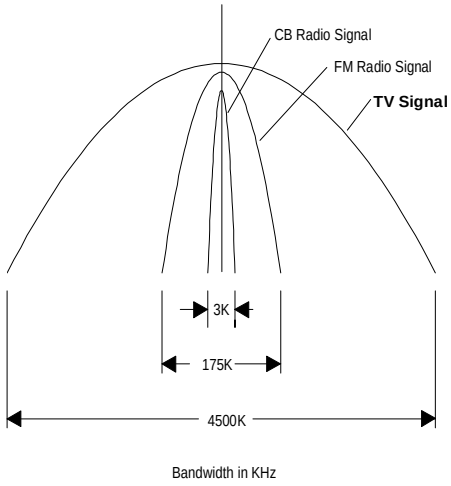

# WLAN Evolution

- **Small, Medium and Large Enterprises**
  - **High power and performance**
- **Telecommuter**
  - **Cost and Manageability**





# Radio Modulation




- More Information = More Frequency Spectrum Used

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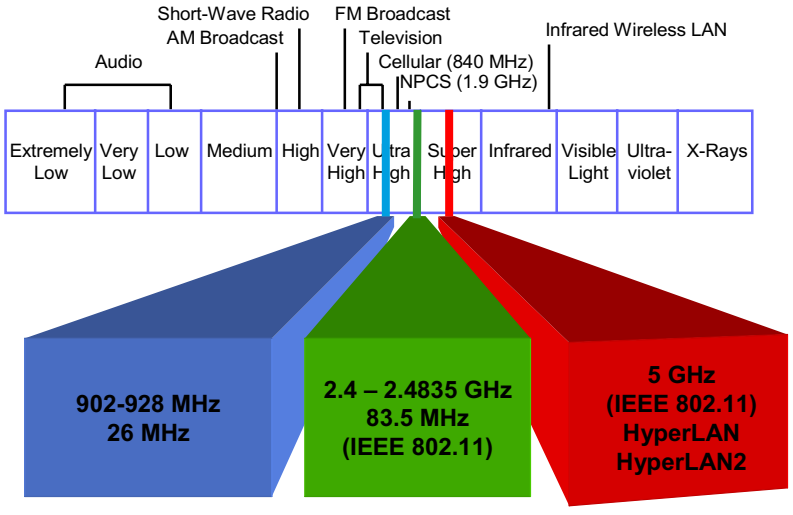
71

# ISM Unlicensed Frequency Bands

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72

## 900 MHz vs. 2.4 GHz vs. 5GHz

| | 900 MHz | 2.4 GHz | 5 GHz |
|---|---|---|---|
| **Pros** | Greater range than 2.4 GHz ( for inbuilding LANs) | Global Market<br>IEEE 802.11<br>Higher data rates (10+ Mbps) | Global Market<br>IEEE 802.11<br>Higher data rates (20+ Mbps) |
| **Cons** | Maximum data rate 1 Mbps<br>Limited bandwidth<br>Crowded band | Less range than 900 MHz (for In-building LANs) | Much less range than 900 or 2.4 GHz<br>Higher-cost RF components<br>Large antenna required |




## IEEE 802.11 Standard—Development

**IEEE 802.11 became a standard in July 1997.**

**Two technologies are defined:**

- **DSSS - 2 and 11Mb**
- **FHSS - 1 and 2 Mbps**

- **IEEE 802.11B became a standard in September 1999.**
  - **Only one RF technology was defined–DSSS @ 11-Mbps**

**802.11 defines a high-performance radio.**

**802.11 promises true vendor interoperability (over the air).**

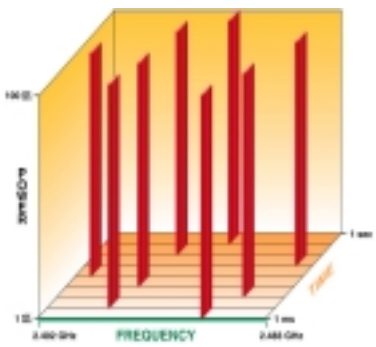
# Frequency Hopping vs. Direct Sequence

- **Frequency Hopping**
  - Older technology
  - Designed for easy interference avoidance
  - Has been slower
- **Direct Sequence**
  - Throughput
  - Range
  - Reliable

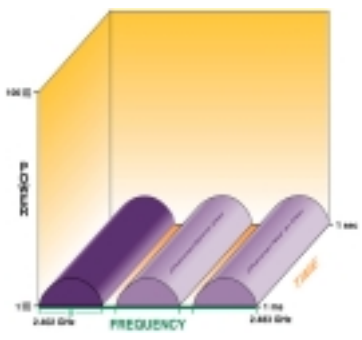



# Spread Spectrum Approaches

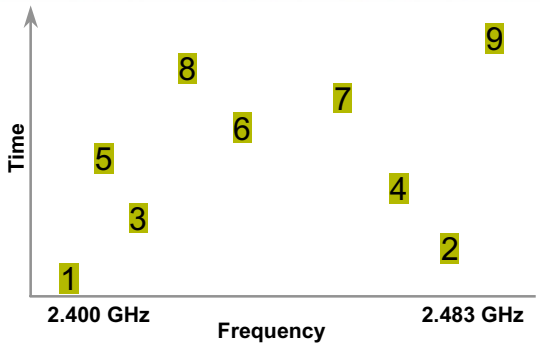
**Frequency Hopping**




**Direct Sequence**



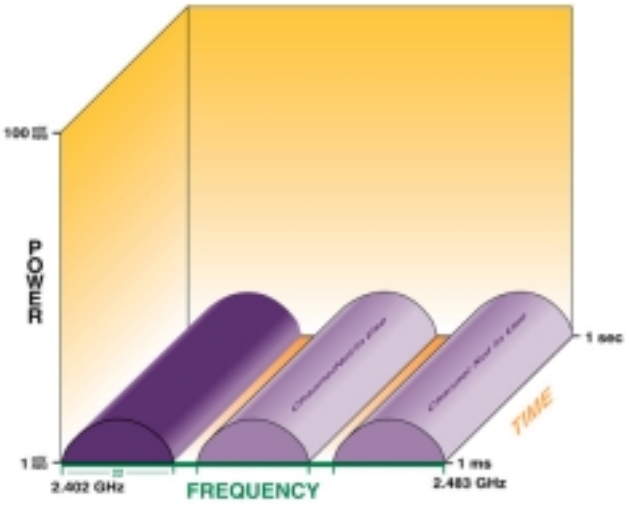
# Frequency Hopping




- 79 Channels, 1 MHz Each
- Changes frequency (Hops) at least every 0.4 seconds
- Synchronized hopping required




# Direct Sequence



# Direct Sequence Modulation

- **Each data bit becomes a string of chips (chipping sequence) transmitted in parallel across a wide frequency range**
- **Minimum chip rate per the FCC is 10 chips for 1 and 2MB (BPSK/QPSK) and 8 chips for 11Mb (CCK) datarates.**

If the data bit was: 1001

Chipping code is : 1=00110011011 0=11001100100

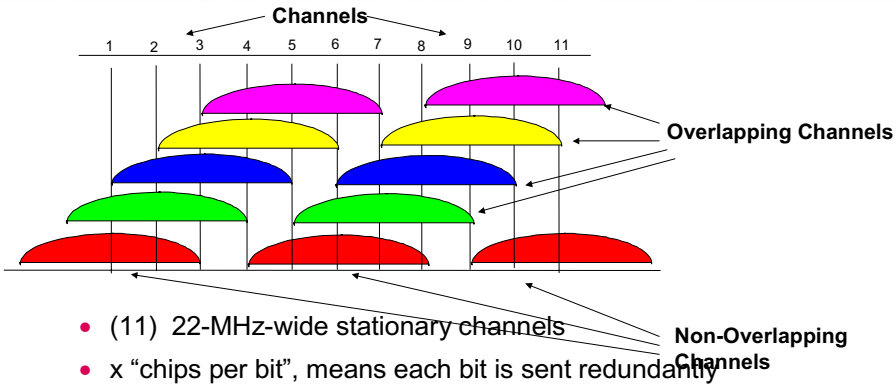
Transmitted data would be:

| 00110011011 | 11001100100 | 11001100100 | 00110011011 |
|---|---|---|---|
| 1 | 0 | 0 | 1 |



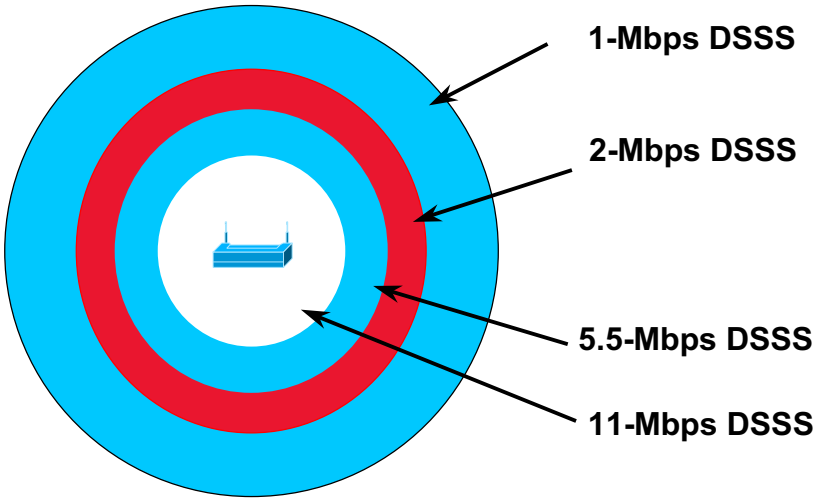


# Channels—802.11 DS




- (11) 22-MHz-wide stationary channels
- x “chips per bit”, means each bit is sent redundantly
- 11-Mbps datarate
- 3 nonoverlapping channels (1, 6, and 11)
- 3 APs can occupy same area - set at different frequencies

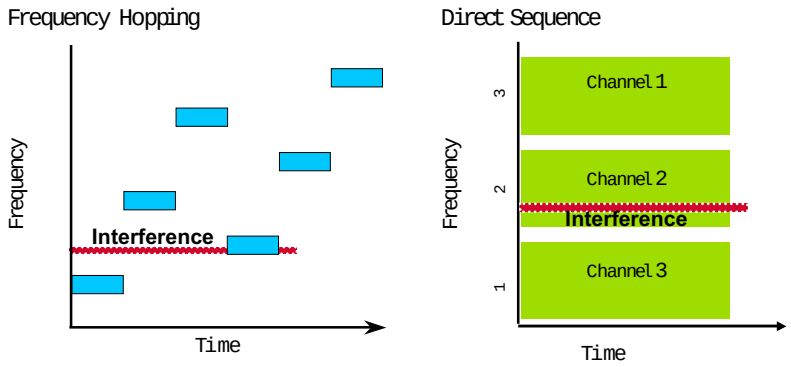
## Access Point Coverage and Data-Rate Shifting







## FH vs. DS: A Summary on Interference Handling



## Data Rates—DS vs. FH

- The “over-the-air” data rate at a given range and given similar implementation will favor DSSS by a factor of 2 to 1.
- A 1-Mbps DSSS system should have twice the range of a 1-Mbps FHSS.
- A 2-Mbps DSSS system will offer comparable range to 1-Mbps FHSS technology.
- For these reasons, the data-rate advantage goes to DSSS.




## In-Building Wireless LANs

# In-Building Wireless LAN—What it Is

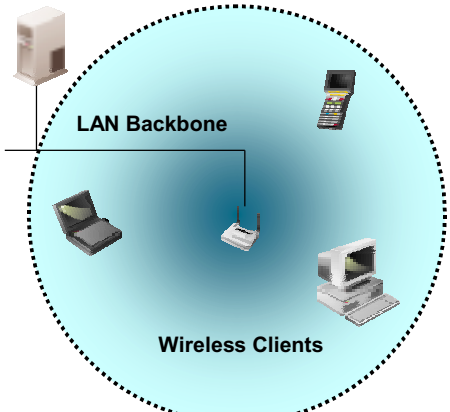
**Access points and client adapters working together to communicate data over radio frequencies**

- **Overlay to existing wired networks**
  - **Enabling mobility**
- **Free standing network when wires aren't feasible**
  - **Enabling fast, flexible LAN's**

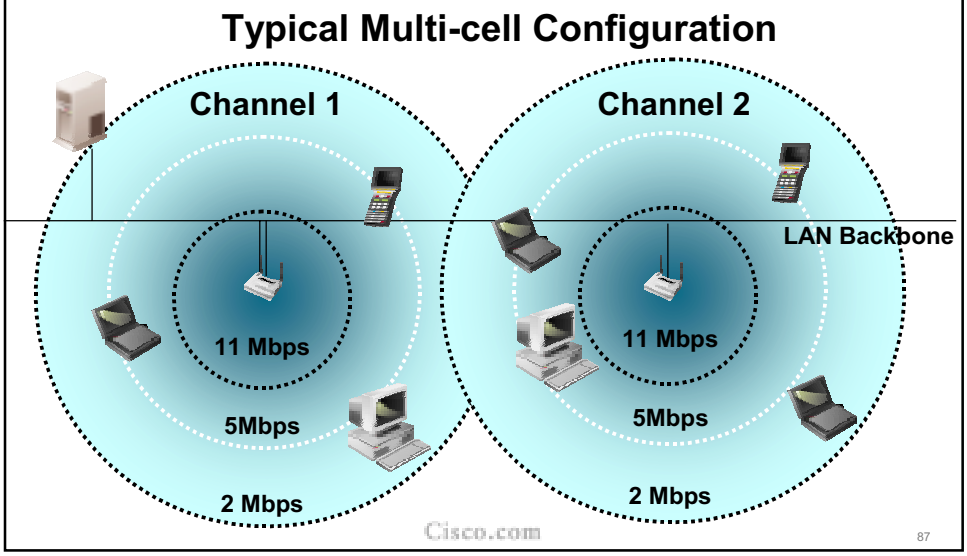



# In-Building Wireless LANs—How it Works

## Typical Single Cell Configuration



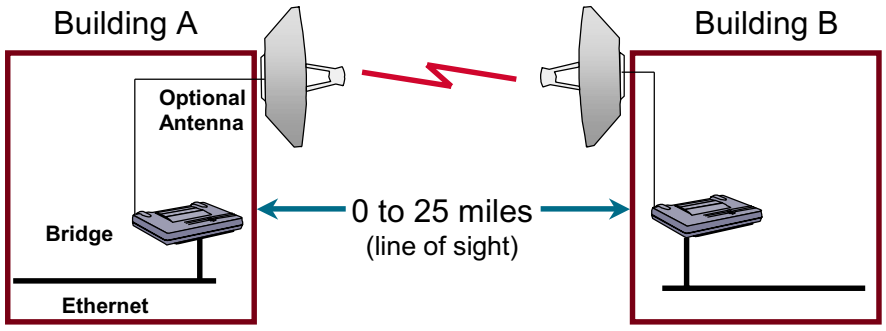
# In-Building Wireless LANs—How it Works




# Building-to-Building Wireless LANs

# Wireless Bridge—How it works

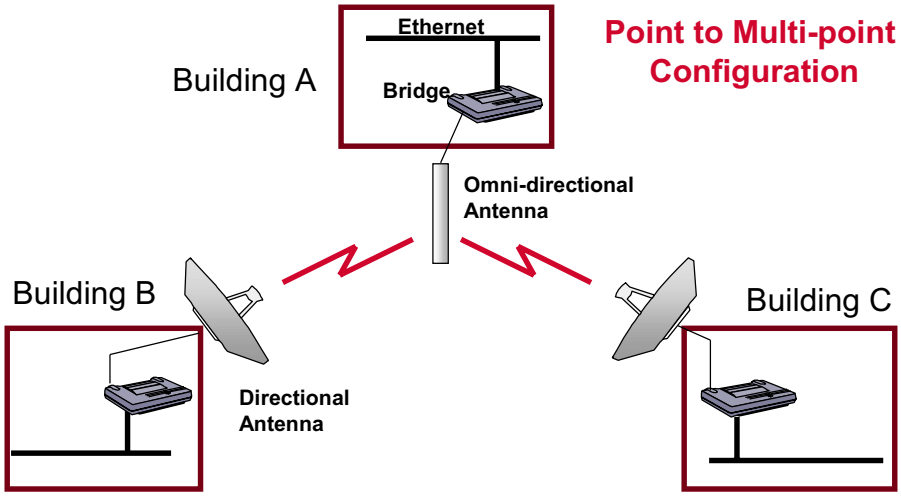
## Point to-Point Configuration






# Wireless Bridge—How it works

## Point to Multi-point Configuration



# Cisco 무선 LAN Solution소개

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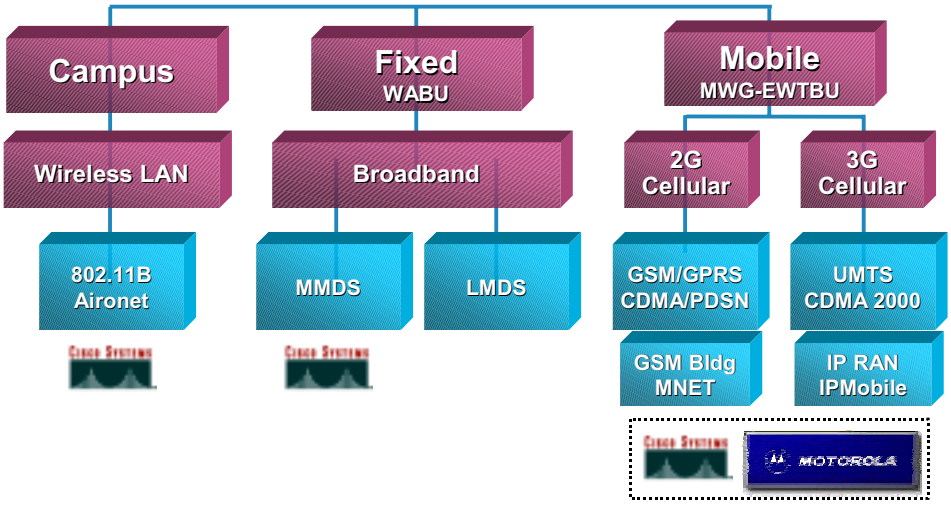
91

## Cisco Wireless at a Glance

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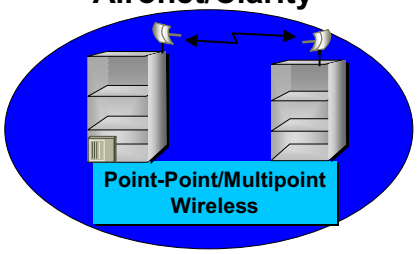
92

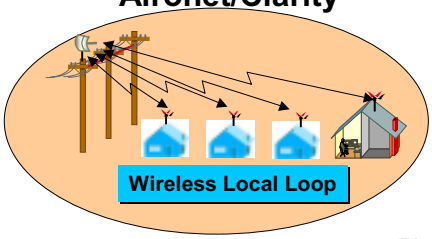
# Cisco's Wireless Initiatives

**Aironet/Clarity**

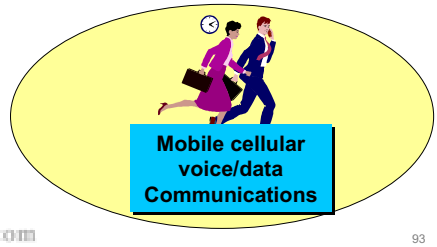



**Aironet**


**Aironet/Clarity**




**Aironet/JetCell/GPRS**







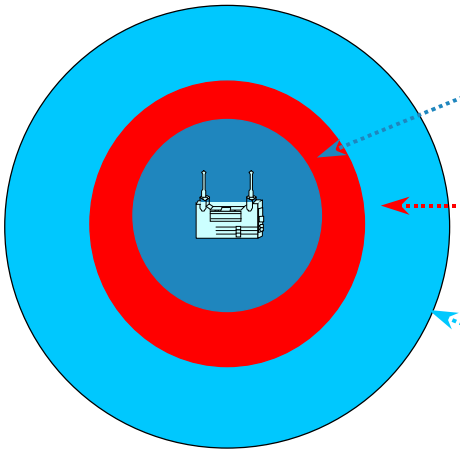

# Cisco 무선랜 제품 소개

Cisco Aironet 무선랜
클라이언트 어댑터(LAN Card)

Cisco Aironet 무선랜
액세스 포인트

Cisco Aironet 무선랜
브리지
액세스 포인트
클라이언트 어댑터

# WLAN Vision: Power and Range



**11 Mbps DSSS**
80-100 feet radius @ 30mW
100-150 feet radius@ 100mW

**5.5 Mbps DSSS**
100-130 feet radius@ 30mW
130-150 feet radius@ 100mW

**2 Mbps DSSS**
200-275 feet radius@30mW
250-350 feet radius@100mW

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# Cisco 무선랜 제품 사양

| | | 제품 SPEC 및 |
|---|---|---|
| 보안기능 | | 40,128 Bit Encryption 지원 |
| AP간 Roaming기능 | | 지원 |
| 유선과의 Interface | | RJ-45, 10/100MB 지원 |
| 제품설치 용이성 | LAN Card | P&P 기능 제공 |
| | Access Point | 사용자 설정 최소화로 간편한 설치 |
| 지원 OS | | Win95/98/2000/CE, NT, Win3.x,Linux, Mac |
| 통신상태 확인 기능 | | 전용툴 (Aironet Client Utility) 사용 |
| LAN Card 소비 전류 | | • Power Save Mode : 10 • RX : 250 • TX : 350 |
| P 지원 | | AP 350 |
| 최대 Client 수 (AP 한 대 ) | | 2,048 |
| 사용주파수 Channel 수 | | 13 |
| 타사 제품간 간섭 정도 | | 사용 주파수가 겹칠 경우 |
| 자체 진단 도구 유무 | | 전용 Tool 제공 (Aironet Client Utility) |
| 전파감도 측정 기능 제공 유무 | | 전 Tool 제공 ( in t te onito ) |
| n e ent 방법 | | P, elnet, C n le, P, |
| 장비 특성 | | Dual Antenna 내장으로 수신감도 탁월, BOOTP/DHCP를 통한 Auto Configuration 가능 |
| 전송거리 | | • 400 • 0 |
| | 사무실 | • • 25 |
| 송신 (AP) | | 30 , 00 (AP350) |
| 제품보증 기간 | | • AP : 1년 • LAN Card : 3년 |

# WLAN 보안기능


- First generation
  - SSID
  - Static 40 or 128-bit WEP
- Cisco 차별화 기능
  - 네트워크 접속 시 중앙 집중적 사용자 인증 (ACS2000 v2.6) (SW V.11.x or AP350)
  - Dynamic 128-bit WEP
  - HW encryption
  - VPN 기능 지원
  - Access Control Lists 지원
- Future plans
  - Rogue AP detection
  - 3rd Party RADIUS server 지원




# Wireless LAN 기술적 제약사항
# Radio Frequency: Office Interference

| 유형 | 예 | Cisco Solution |
|---|---|---|
| 방해전파 | 전파특성상 타 전파에 의한 Bandwidth 감소. | 100mW의 출력으로 높은 S/N에서도 11Mbps Throughput을 유지. 또한 Directional/Omni-directional 안테나 옵션을 이용하여, 감도를 높일 수 있음. |
| AP/안테나 설치 | 전원공급(Power Supply) 설치에 따른 위치 문제점, | Inline Power Supply(기존 Inline Power를 지원하는 Cisco Switch와 LAN 선으로 연결) |
| 전파 방해물 | AP 위치 선정 시 예상되는 전파 방해물에 의한 Datarate 감소지역 | Cisco Client Utility 중 Site Survey Tool을 이용하여, Signal 감소 지역을 탐지할 수 있음. 결과에 따라 AP를 적절히 설치할 수 있음. 또한 결과에 따라 알맞은 안테나를 선택할 수 있음. |

## Wireless LAN 기술적 제약사항
## Security

| 유형 | 예 | Cisco Solution |
|---|---|---|
| Encryption Overhead | Wireless 상에서 고성능 WEP을 이용시 발생하는 성능 저하(10-15%) | Cisco는 WEP optimization을 실현, 3DES(168bit) Encryption이용시 3-5% 만의 성능저하를 실현. |
| Key 관리 (Pre-shared) | AP 마다 다른 Key를 사용시 발생하는 Client(AP)쪽 Key관리 | Cisco AP및 Client는 총 4개까지의 Key를 입력하여, 자동선택할 수 있음. |
| Key Management | Wireless LAN관리자가 Pre-shared key들을관리하기 위해, AP별로, Client별로 입력하는 번거로움. | 11.0 SW/AP 350에서는Certificate관리를 통해, Administrative burden을 줄임(PKI). 또한 802.X 및 EAP을 지원. |

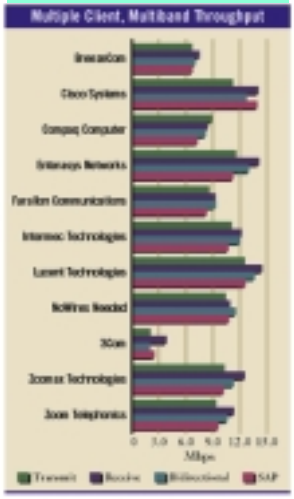


## Wireless LAN 기술적 제약사항
## WLAN Enhancements

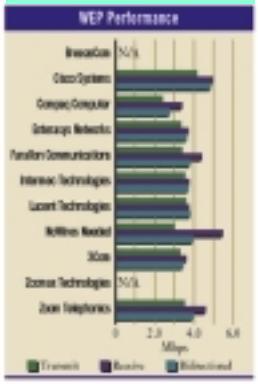
| 유형 | Cisco Solution |
|---|---|
| Ad-hoc /Infrastructure /Workgroup Mode 지원 | 용도에따라, client Peer간에 Workgroup mode로 사용하거나(sample 1 참조), Wired Network에 연결되지 않은 AP와의 Ad-hoc Mode(sample 2 참조), 아니면, Wired Network에 연결된 Infrastructure Mode등으로 사용할 수 있음. |
| Aggregated 33Mbps Throughput | 같은 Cell에 최고 3개의 non-contiguous channel을(1.6.11) 사용하여, 33Mbps의 효과를 올릴 수 있음(sample 3참조). 또한 Road-Balancing 역활도 함께 수행. |
| AP간 정보교환관 및 Rogue AP관리 | Wired Network에 연결된 AP들은 서로 client association및 그 밖의 client정보들을 서로 교환함으로써, client들은 제 association없이 다른 AP로 접속할 수 있음(Roaming및 Load balancing, Fail-over 시).<br>Fail-over(Sample 5 참조)<br>Roaming(Sample 6 참조) |
| 22Mbps upgrade지원 | 금년 8월경에 AP와 client의 image upgrade형식으로, 22Mbps upgrade를 지원할 예정. |
| Repeater/Bridging 지원 | 지역적 특성을 고려하여 AP와 AP를 Wireless로 연결하는 Repeater기능을 탑제했음. 총 7개 AP를 이어 client들과 Wired Network을 연결할 수 있음(sample 4참조). 또한 bridge와 여러 안테나를 사용하여, Building to Building, site to site을 연결할 수 있음. |

# Cisco 장비 성능테스트 자료

•Multiple Client Throughput 테스트

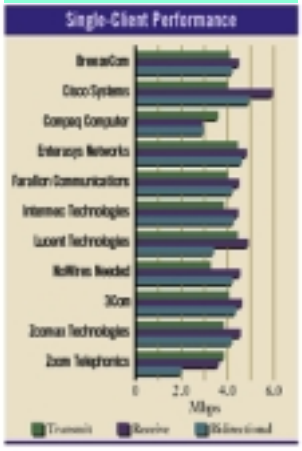



•WEP Performance 테스트




• 자료출처 : Network Computing 2000년 7월, Editor's Choice

• Single Client Performance 테스트






# 감사합니다

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