



# TECHNOLOGY GOT YOU BAFFLED? HERE ARE SOME ANSWERS?

SCOTT KSANDER

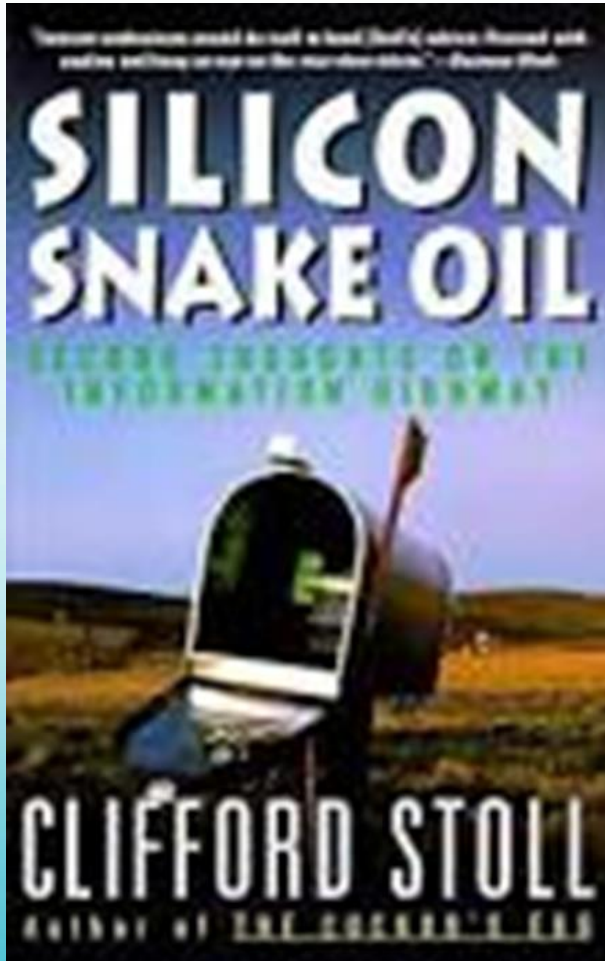
KSANDER@PURDUE.EDU



Purdue University Retirees Association

63 SLIDES TO GO



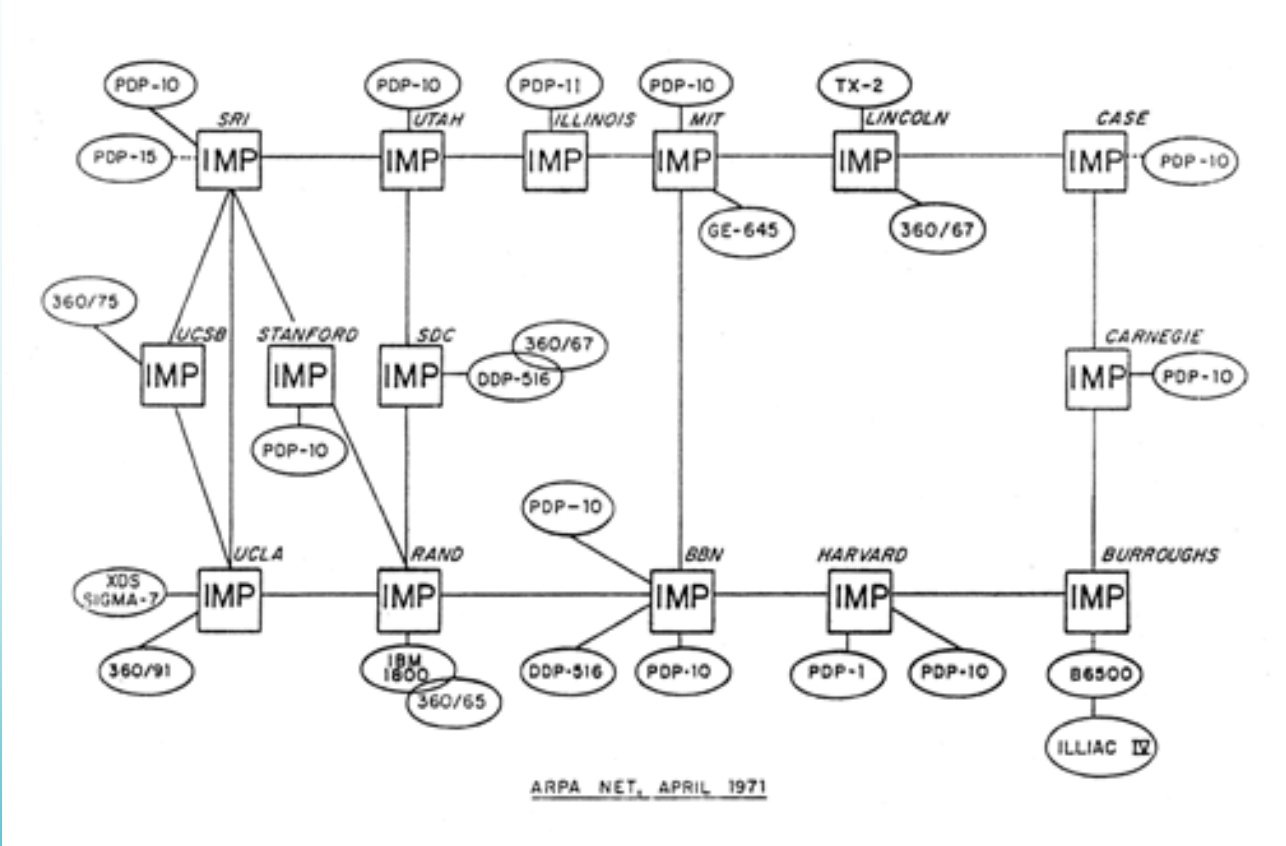


## RECOMMENDED READING

- A September, 1995 perspective
- ISBN-10: 0333647874
- ISBN-13: 978-0333647875

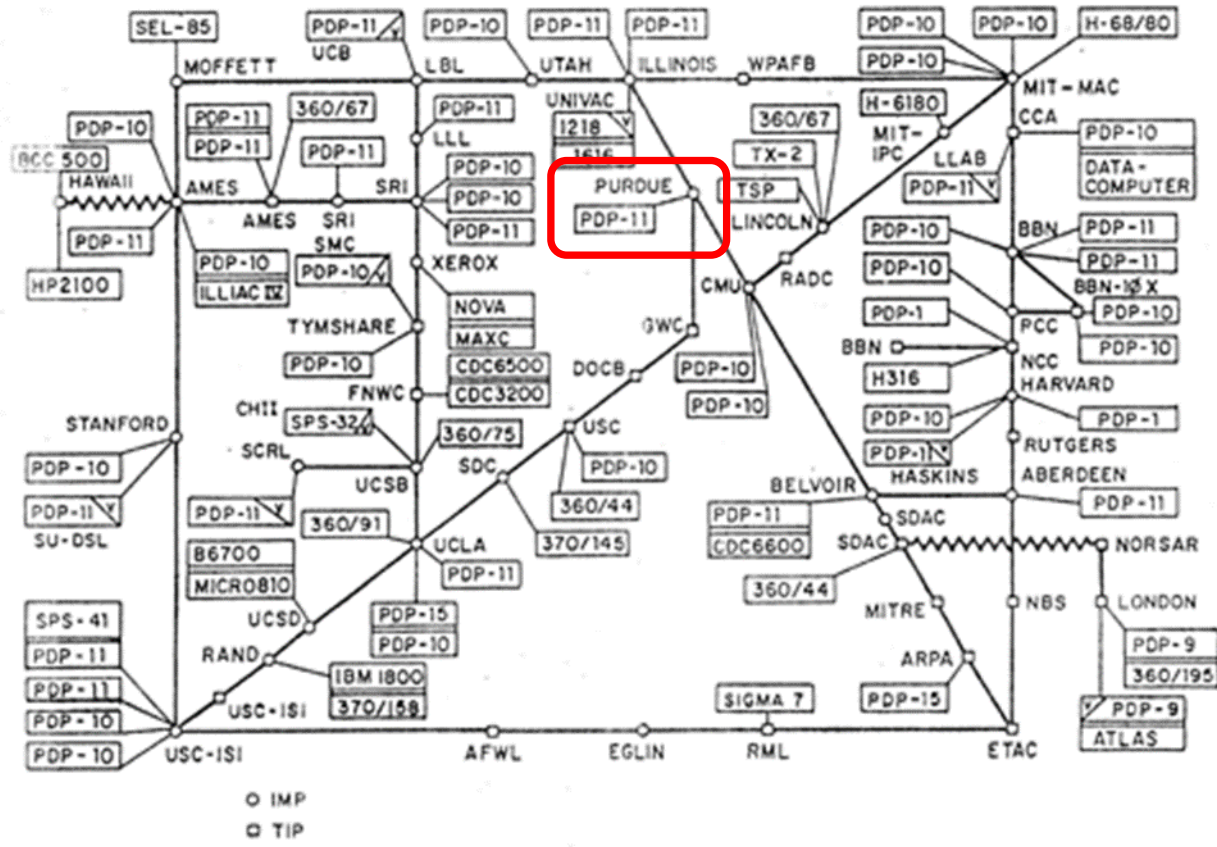
"Few aspects of daily life require computers...They're irrelevant to cooking, driving, visiting, negotiating, eating, hiking, dancing, speaking, and gossiping. You don't need a computer to...recite a poem or say a prayer."

APRIL, 1971



- The beginning of the “Internet”
- Nodes connected by 56Kbps lines
- No Purdue connection yet

ARPA NETWORK, LOGICAL MAP, JANUARY 1975



JANUARY, 1975

- Purdue connection
- Connections still 56Kbps
- First T1 (1.5Mbps) didn't appear until 1988

# KILOBYTE (KB)

- A Kilobyte is 1,024 bytes.
- **2 or 3** paragraphs of text.
- **Megabyte (MB)**

# MEGABYTE (MB)

- A Megabyte is 1,048,576 bytes or 1,024 Kilobytes
- **873** pages of plaintext (1,200 characters)
- **4** books (200 pages or 240,000 characters)

# GIGABYTE

- A Gigabyte is 1,073,741,824 ( $2^{30}$ ) bytes. 1,024 Megabytes, or 1,048,576 Kilobytes.
- **894,784** pages of plaintext
- **4,473** books
- **640** web pages (with 1.6MB average file size)
- **341** digital pictures (with 3MB average file size)
- **256** MP3 audio files (with 4MB average file size)



# TERABYTE

- A Terabyte is 1,099,511,627,776 ( $2^{40}$ ) bytes, 1,024 Gigabytes, or 1,048,576 Megabytes.
- **916,259,689** pages of plaintext
- **4,581,298** books
- **655,360** web pages (with 1.6MB average file size)
- **349,525** digital pictures (with 3MB average file size)
- **262,144** MP3 audio files (with 4MB average file size)
- **1,613** CD's / **233** 4.38GB DVD's
- All the **data** in the American **Library of Congress** amounts to 15 TB

# PETABYTE (PB)

- A Petabyte is 1,125,899,906,842,624 ( $2^{50}$ ) bytes, 1,024 Terabytes, 1,048,576 Gigabytes, or 1,073,741,824 Megabytes.
- **938,249,922,368** pages of plaintext
- **4,691,249,611** books
- **671,088,640** web pages (with 1.6MB average file size)
- **357,913,941** digital pictures (with 3MB average file size)
- **268,435,456** MP3 audio files (with 4MB average file size)
- **1,651,910** CD's / **239,400** DVD's
- **41,943** 25GB Blu-ray discs

## Exabyte (EB)

An Exabyte is 1,152,921,504,606,846,976 ( $2^{60}$ ) bytes, 1,024 Petabytes, 1,048,576 Terabytes  
**960,767,920,505,705** pages of plaintext

## Zettabyte (ZB)

A Zettabyte is 1,180,591,620,717,411,303,424 ( $2^{70}$ ) bytes, 1,024 Exabytes, 1,048,576 Petabytes  
**983,826,350,597,842,752** pages of plaintext

## Yottabyte (YB)

A Yottabyte is 1,208,925,819,614,629,174,706,176 ( $2^{80}$ ) bytes, 1,024 Zettabytes, 1,048,576 Exabytes  
**1,007,438,183,012,190,978,921** pages of plaintext



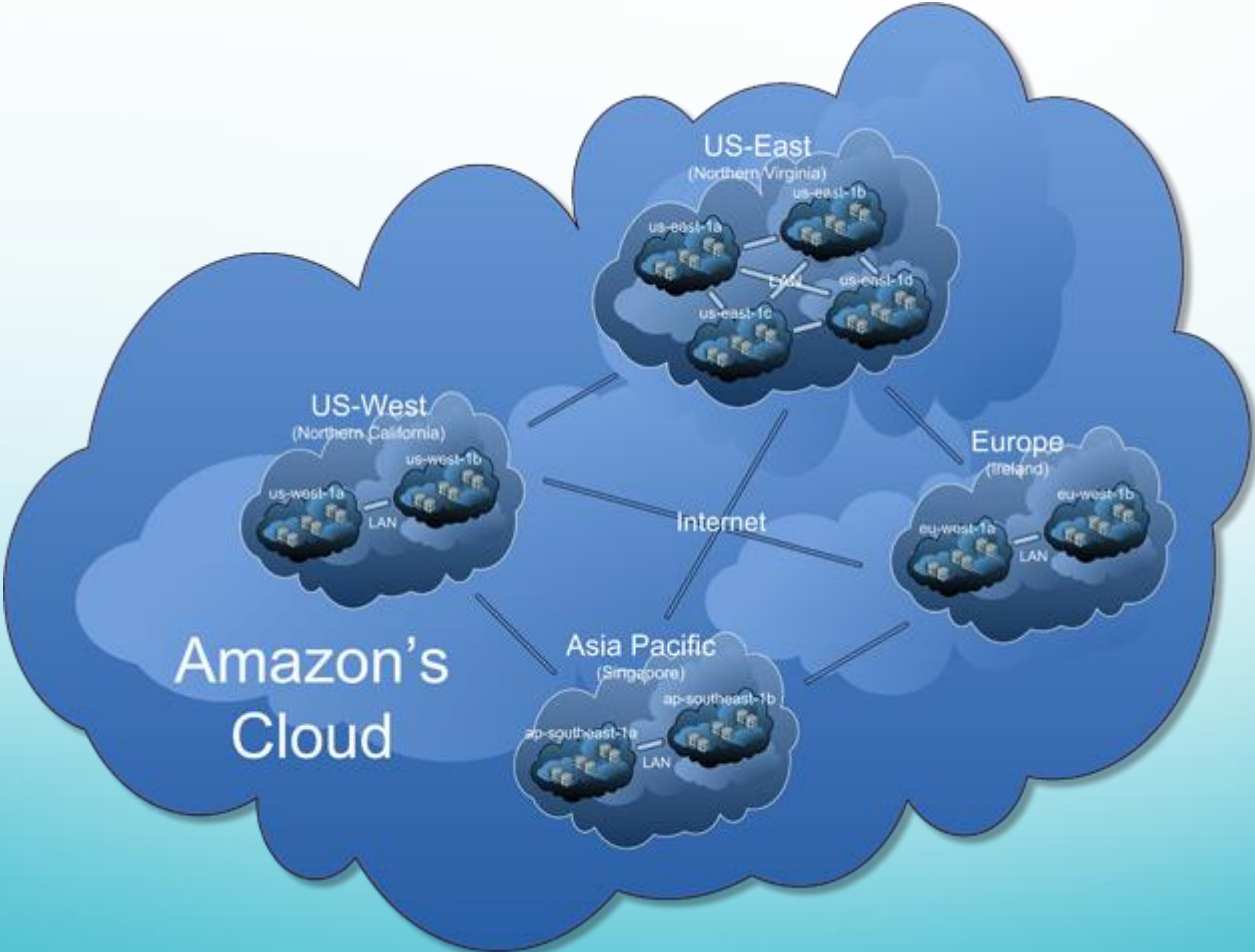
WHAT IS  
"THE CLOUD"?

# IT HAS NOTHING TO DO WITH WHITE FLUFFY THINGS IN THE SKY

- It has a terrestrial home. It's stored somewhere — lots of somewheres — and the network of servers find what you need and deliver it.
- The cloud refers to software and services that run on the Internet, instead of locally on your computer.
- The advantage of the cloud is that you can access your information on any device with an Internet connection.



# AMAZON CLOUD



- Worldwide
- Redundant
- No single point of failure
- 24/7

# MICROSOFT CLOUD





CONNECTED  
ADVERTISING  
SOCIAL MEDIA  
SERVICES  
WWW  
CES  
OBJECTS  
WEB  
SMART  
MACHINES  
OBJECTS  
VISION  
ENGINEERING  
WEB DEV  
STRATEGY  
WORLDWIDE  
ORGANIZATION  
SEGMENT  
MOBILE  
SOLUTIONS  
PROJECTS  
BIG DATA  
CLOUD  
EVERYTHING  
OMOBILE

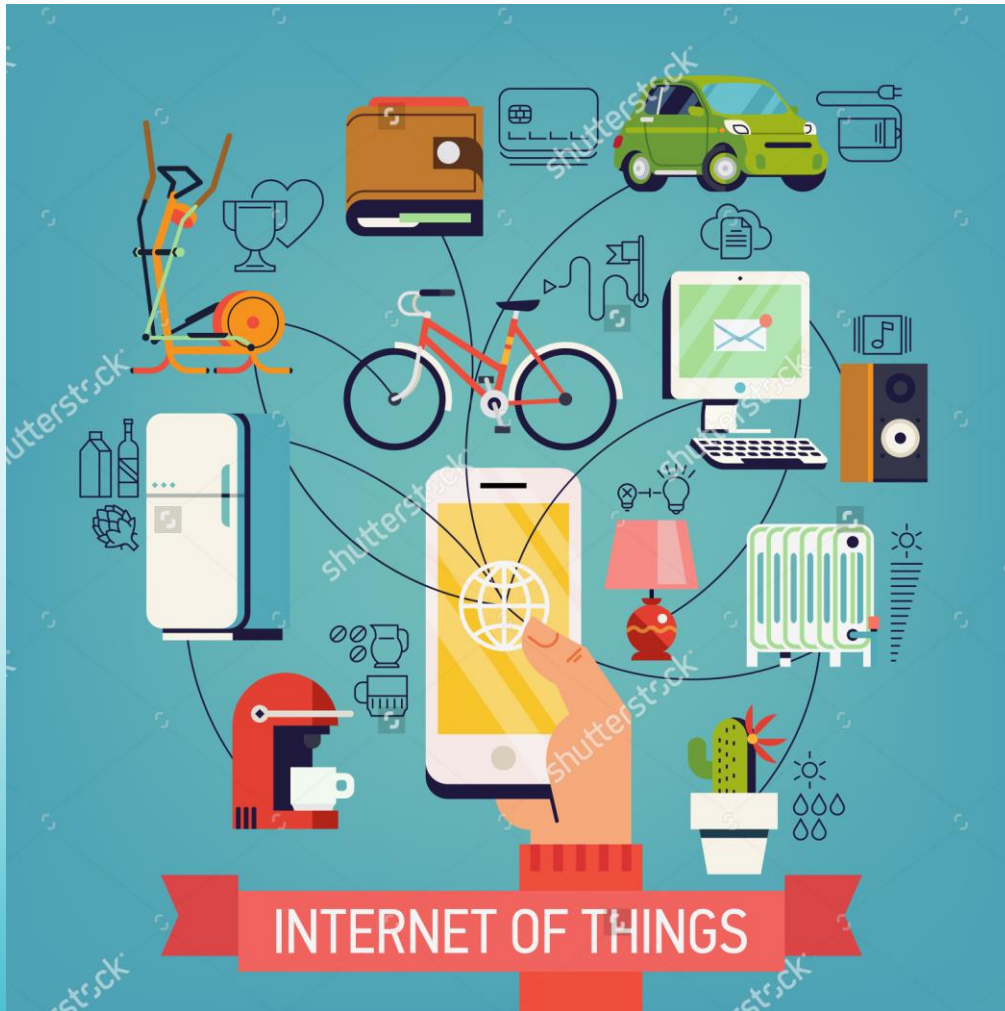
MARKETING  
COMMUNICATION  
SERVICES  
SMART  
CONSUMER  
ORGANIZATION  
SEO  
PLANNING  
PROGRAMMING

INFORMATION  
DIGITAL  
W3C  
MARKET  
MACHINES  
BRANDING  
M2M  
CONSUMER DEMAND  
WEB MARKETING  
SOCIAL  
STATISTICS  
EQUIPMENT  
APPS  
SOCIAL NETWORKS  
RESEARCH  
COMMERCE  
AUTOMATION  
M2M  
TOOLS

CONTENT  
CODING  
SOFTWARE  
BRAND

**THE  
INTERNET  
OF THINGS**

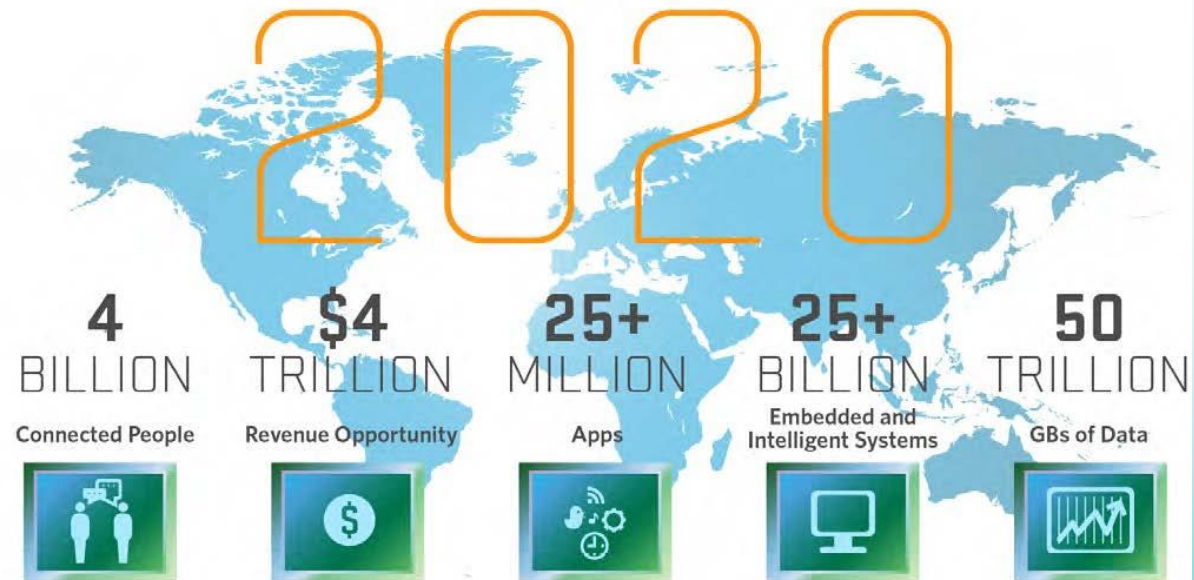




## INTERNET OF THINGS

- The Internet of things (IoT) is the inter-networking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.

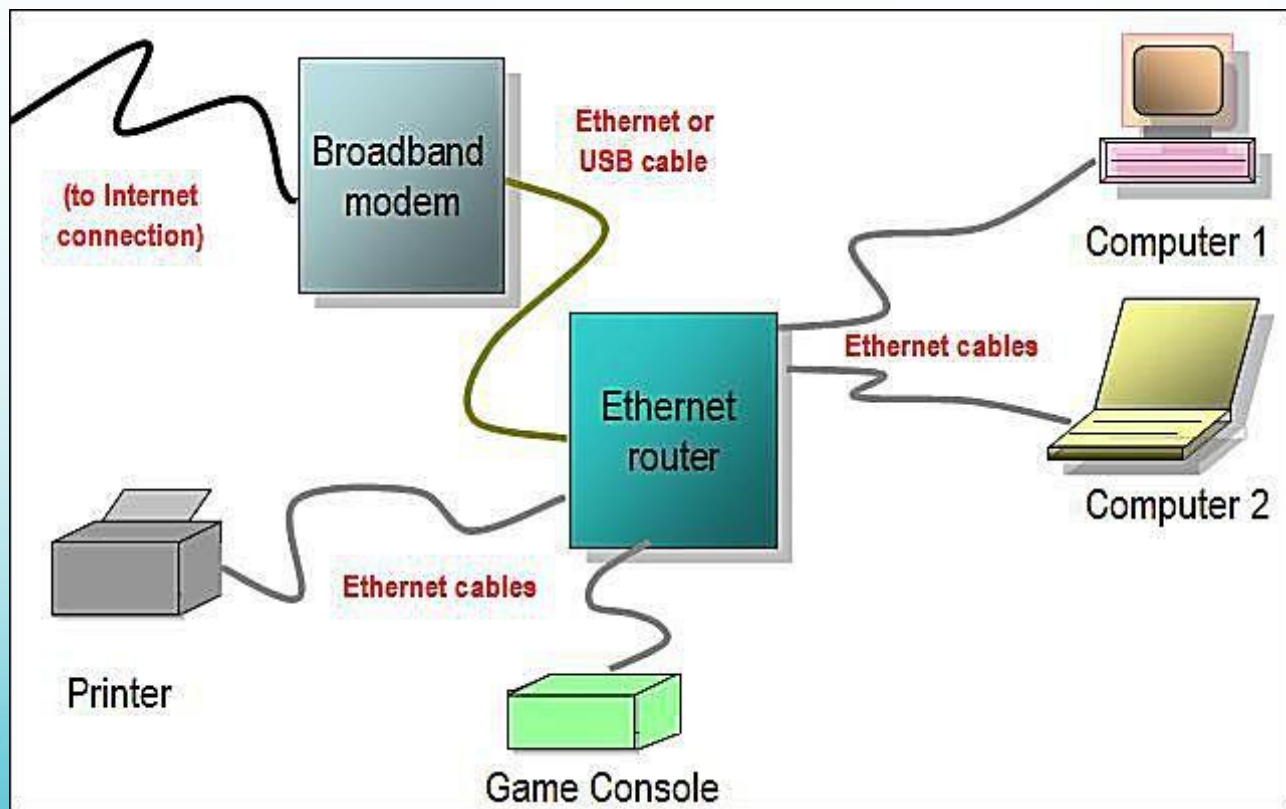
# INTERNET OF THE FUTURE



Source: Mario Morales, IDC

- Purdue University alone this year has about 500,000 connected devices on campus
- Number of devices increases dramatically every year

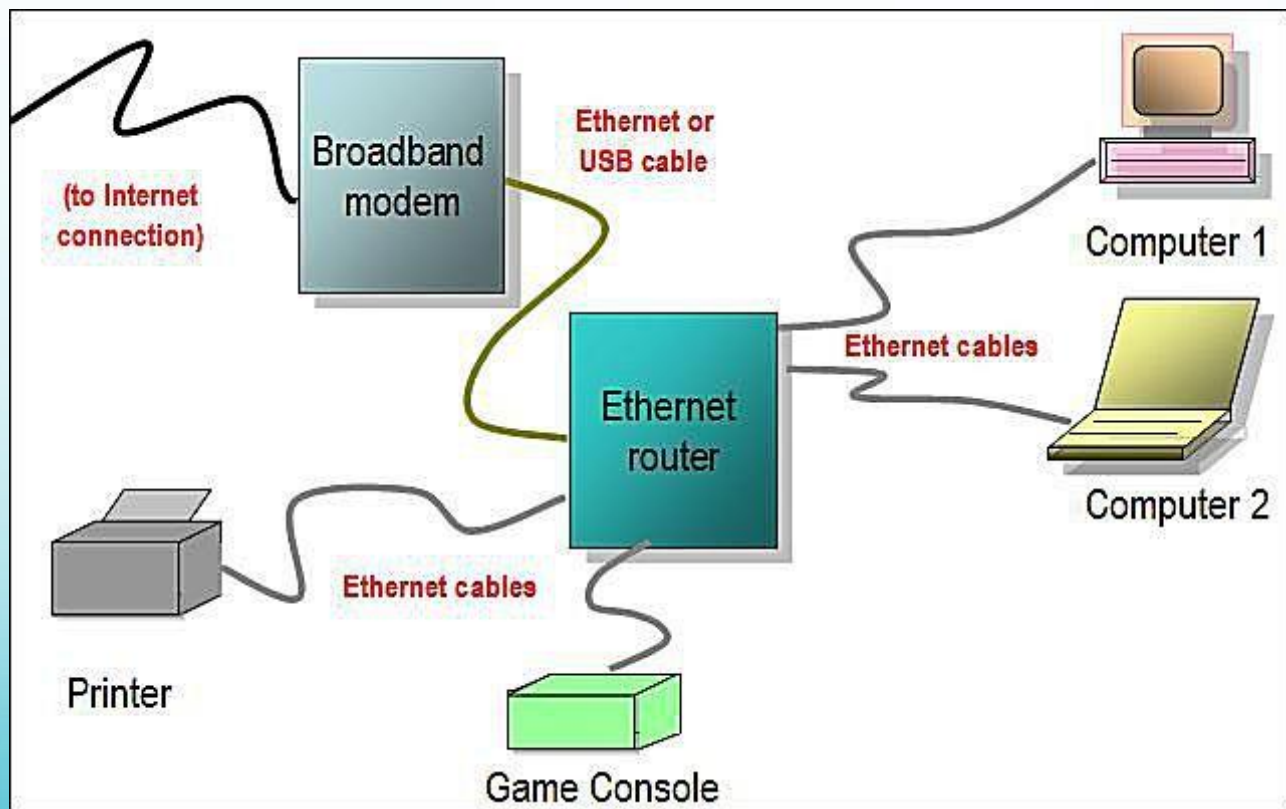






# MODEM

- The word modem is actually short for Modulator/Demodulator. A modem is a communications device that can be either internal or external to your computer. It allows one computer to connect another computer and transfer data over various media such as telephone lines, cable, or fiber.
- ARRIS SURFboard SB6141 DOCSIS 3.0 Cable Modem - \$60 at Amazon or \$10/month rental from Comcast





## ROUTER

- A network device that forwards data packets from one network to another. Based on the address of the destination network in the incoming packet the router determines which port (line) to send out the packet.
- Usually functions as a **Firewall** to protect your home network
- Approx \$40 on Amazon

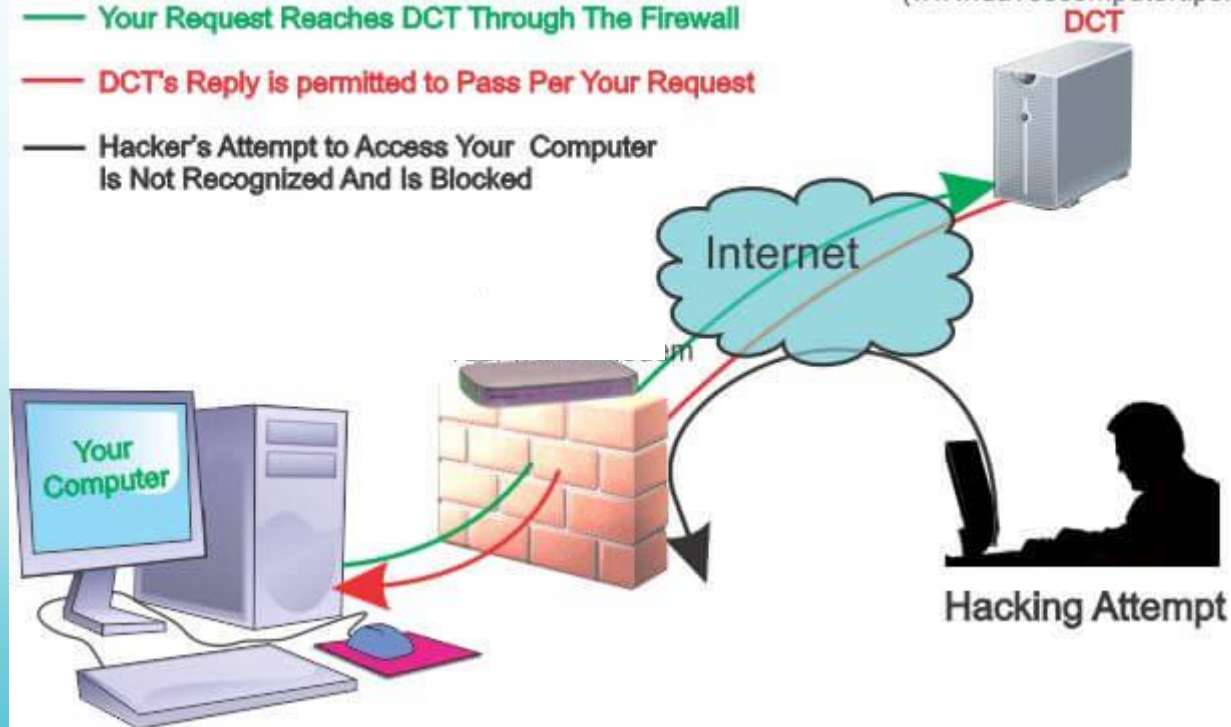
# How Router Firewalls Work

(www.davescomputertips.com)

— Your Request Reaches DCT Through The Firewall

— DCT's Reply is permitted to Pass Per Your Request

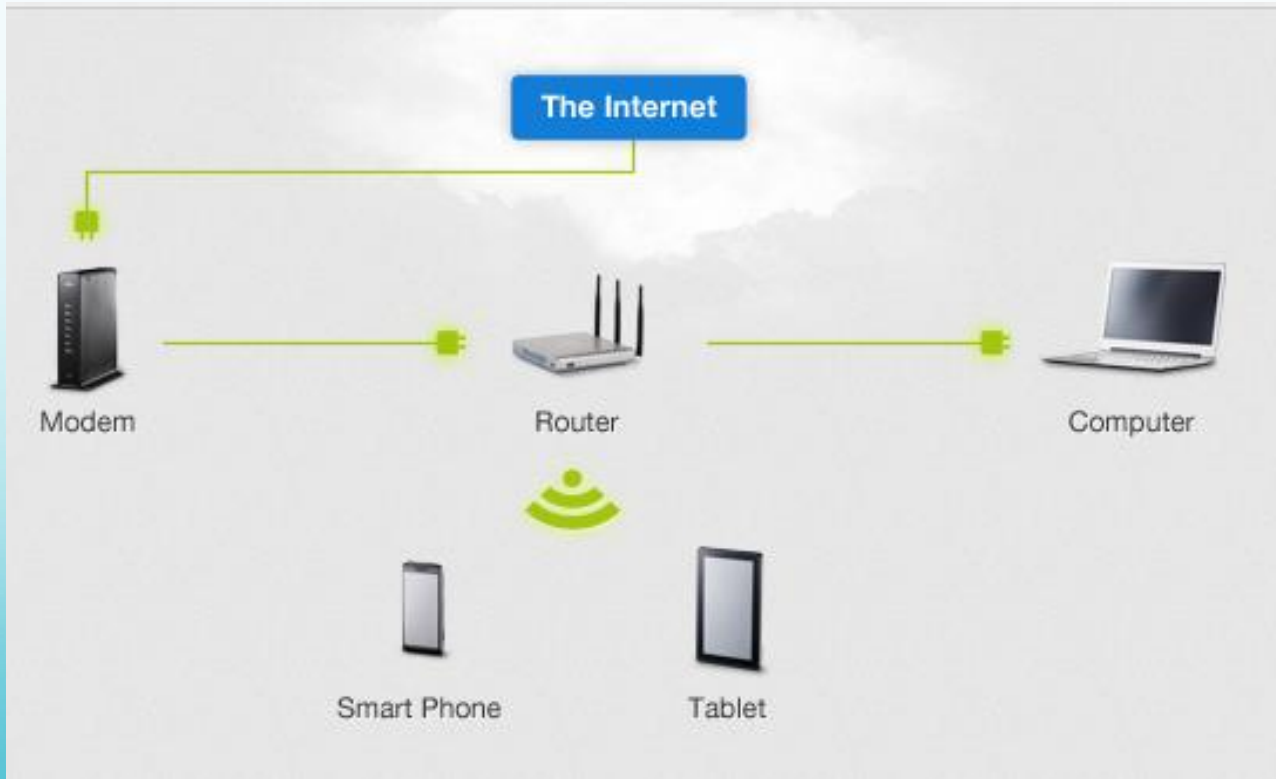
— Hacker's Attempt to Access Your Computer Is Not Recognized And Is Blocked



## FIREWALL

- All traffic allowed outbound
- Only inbound traffic allowed in response to outbound traffic
- Unsolicited traffic is blocked

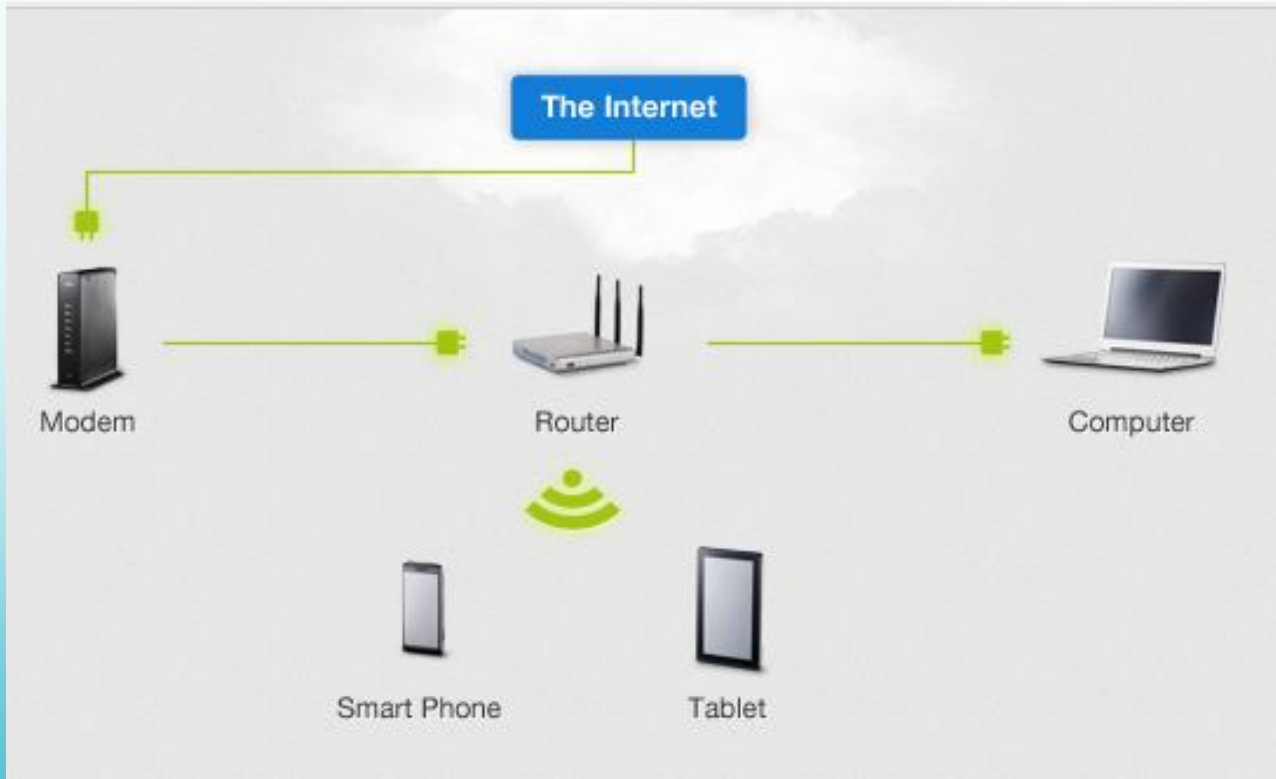






## WI-FI ROUTER AKA ACCESS POINT

- **Linksys WRT AC1200  
Dual-Band and Wi-Fi  
Wireless Router  
(WRT1200AC) approx \$90  
from Amazon**





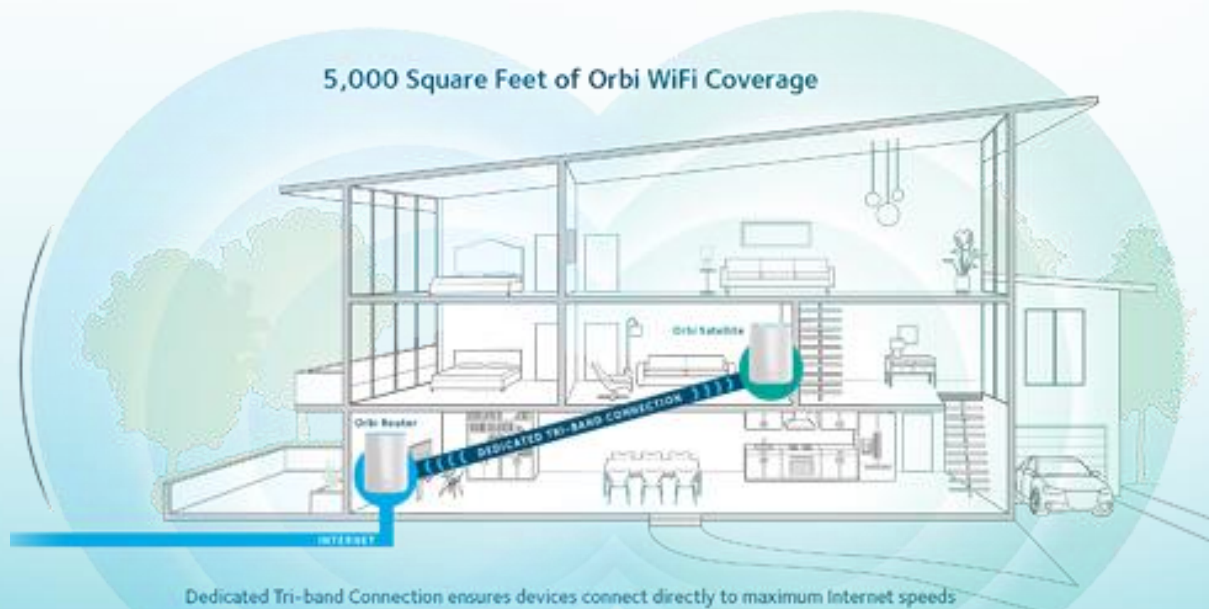
## ALL-IN-ONE

- Cable Modem
- Router
- Wi-Fi Access Point
- ARRIS SURFboard SBG6400 DOCSIS 3.0 Cable Modem/Wi-Fi N Router
- \$90 at Amazon or \$10/month rental from Comcast



"You are so lucky. When I was your age, I couldn't play outside because the wifi connection was spotty."

36 SLIDES TO GO



## COVERAGE!!!

### “WI-FI MESH”

- Netgear ORBI is current market leader
- Impressive results
- Also higher price at \$300-\$380 at Amazon

WLAN



802.11 Standards

34 SLIDES TO GO

# WI-FI STANDARD ALPHABET SOUP

1

802.11 a/b/g/n/ac

2

Futures  
ad/ah/ai/ax/ay/az

3

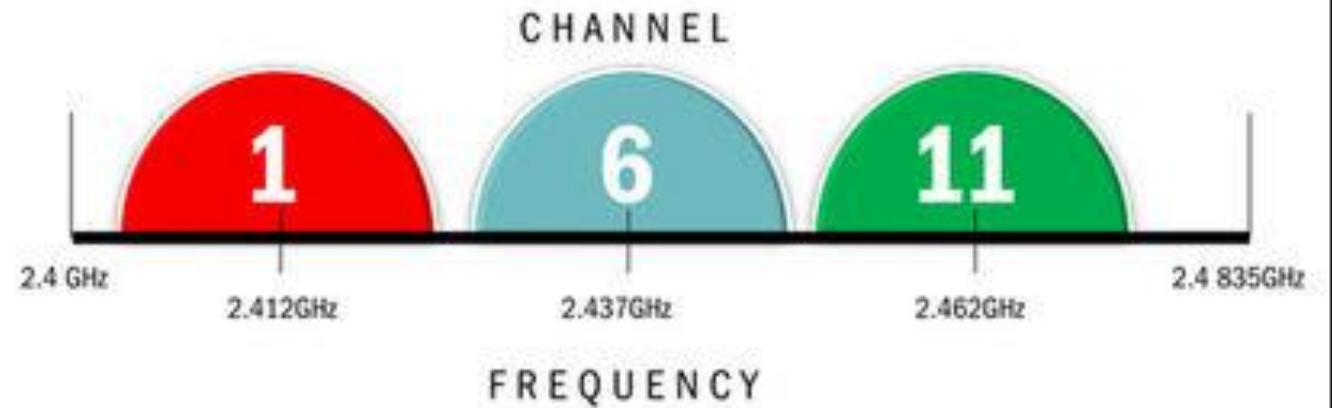
In short, it is all about speed. Most new devices are 802.11n and 802.11ac



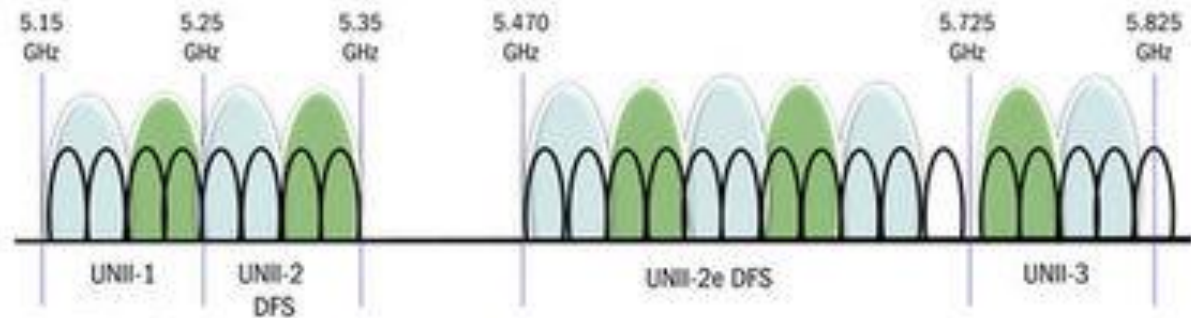
# WI-FI BY THE NUMBERS

- 2.4GHz is the original (and crowded) spectrum
- 5GHz is newer adding more capacity. Higher speed but less coverage distance
- Bottom line is about congestion, speed, and coverage

## The Wi-Fi Spectrum: 2.4GHz



## The Wi-Fi Spectrum: 5GHz



source: [www.tomshardware.com](http://www.tomshardware.com)



31 SLIDES TO GO

AND

**HALFTIME!!**

## TOOL TO CHECK YOUR SPEED AND CONNECTIVITY

- Check from wire connected device and Wi-Fi device
- Check results against the plan you purchased



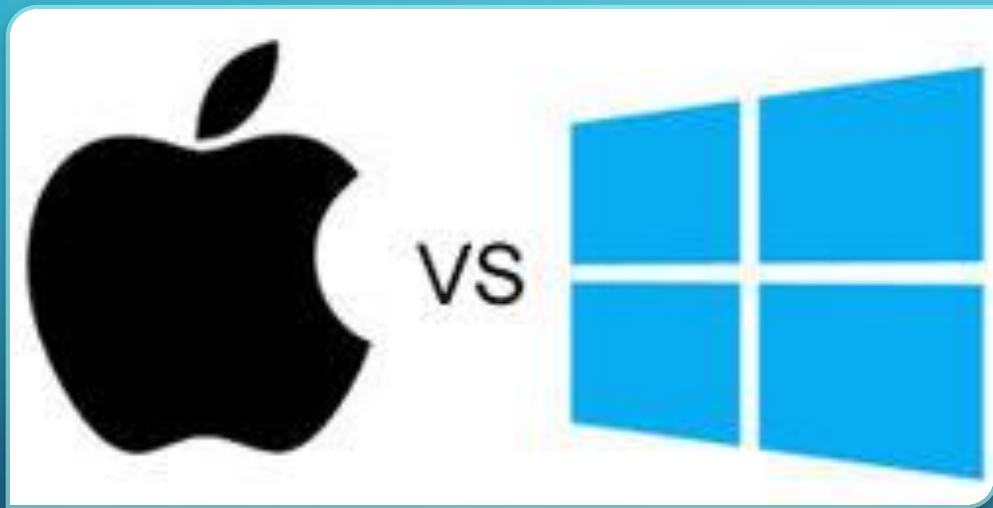
The screenshot shows the Xfinity Speed Test website. On the left, there is a navigation menu with sections: "Getting Started", "My Results", and "Speed Factors". Under "Getting Started", there are four links: "What must be installed to use XFINITY Speed Test?", "How do I get the most accurate speed test results?", "What is the best way to use XFINITY Speed Test?", and "How does XFINITY Speed Test work?". The main content area features a map of the United States with several server location icons. A yellow button at the bottom of the map says "BEGIN SPEED TEST". Text at the top right of the map area reads "Your Recommended Server is: Newcastle, DE". The Xfinity logo is in the top left corner of the map area.

<http://speedtest.xfinity.com/>



29 SLIDES TO GO

# APPLE VS MICROSOFT?



## APPLE VS MICROSOFT?

**Top 5 Vendors, Worldwide PC Shipments, First Quarter 2016 (Preliminary)**  
(Shipments are in thousands of units)

Rank	Vendor	Q116 Shipments	Q116 Market Share	Q115 Shipments	Q115 Market Share	Q116/Q115 Growth
1	Lenovo	12,178	20.1%	13,305	19.4%	-8.5%
2	HP Inc.	11,603	19.2%	13,006	19.0%	-10.8%
3	Dell	9,017	14.9%	9,201	13.4%	-2.0%
4	Apple	4,466	7.4%	4,560	6.7%	-2.1%
5	ASUS	4,392	7.2%	4,788	7.0%	-8.3%
	Others	18,929	31.2%	23,611	34.5%	-19.8%
	Total	60,584	100.0%	68,470	100.0%	-11.5%

Source: IDC Worldwide Quarterly PC Tracker, April 11, 2016

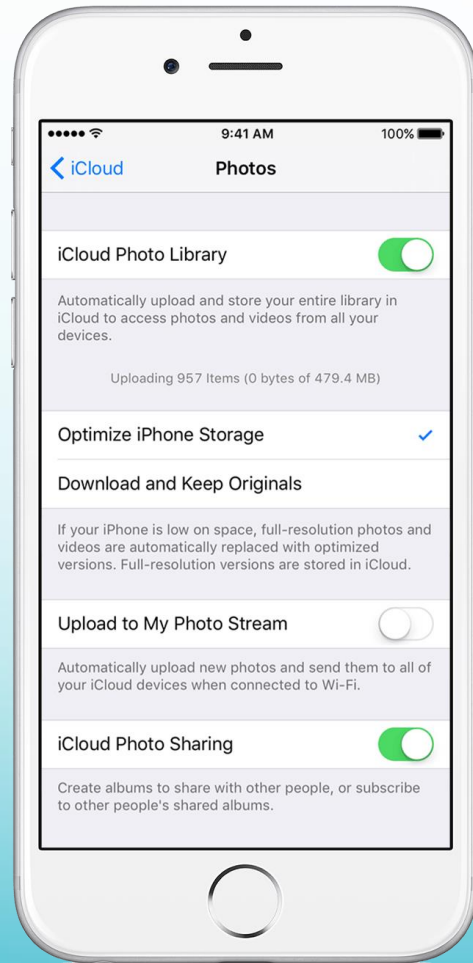
The religious war is pretty much over. Each has advantages and disadvantages

Bottom Line – it doesn't matter. Select what is right for you. It is all about the applications. Will it do what you want in a way you find reasonable?



# PHOTOS

- Easiest and most effective access to pictures is to backup photos from your phone to the cloud and then download to other devices
- iCloud
- Amazon Cloud
- Google Cloud
- Others (such as Shutterfly)

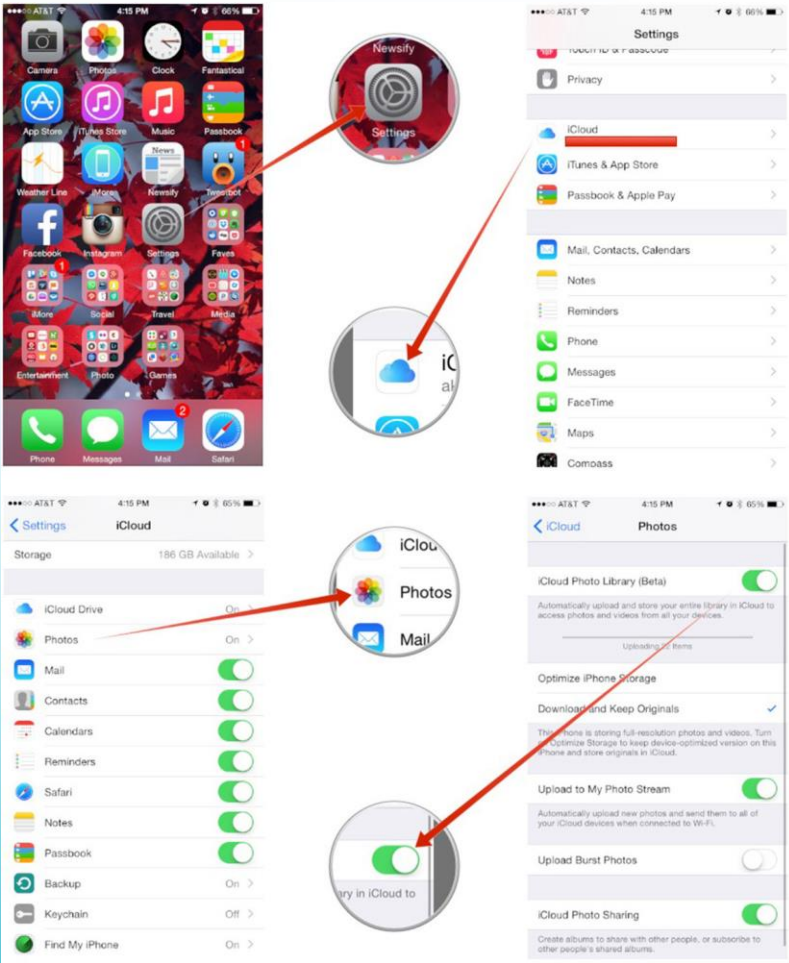


## ICLOUD PHOTO LIBRARY

- Keep pictures in the cloud at FULL resolution.
- Keep lower resolution copies on your phone
- iCloud for Windows and Mac
- Additional storage purchased as needed



# TURN ON ICLOUD PHOTO LIBRARY

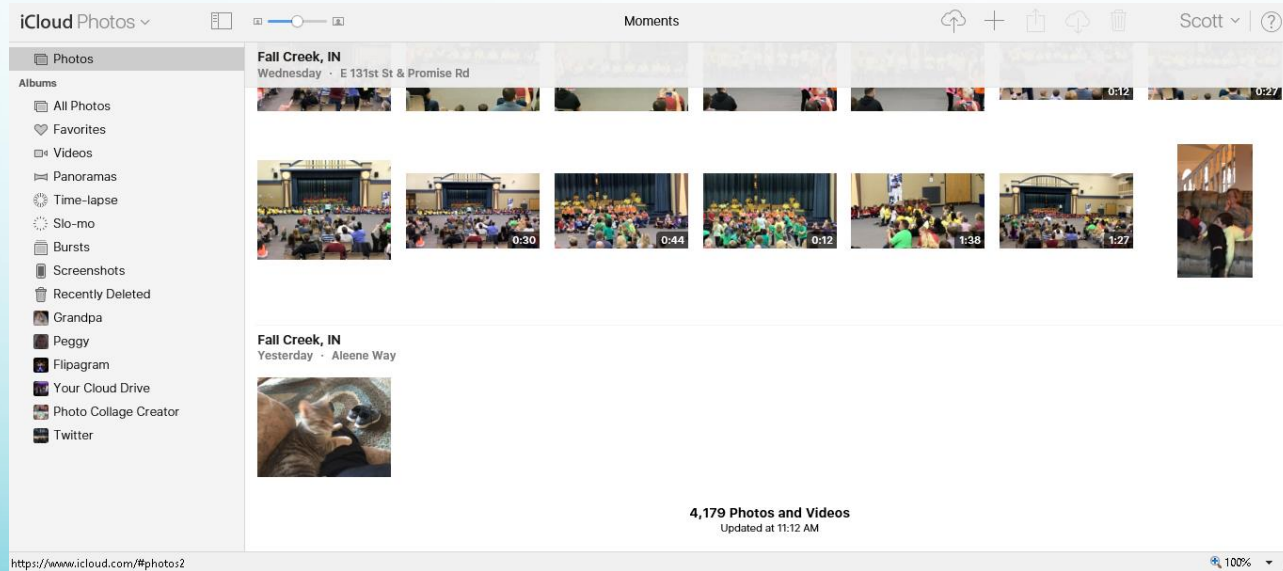


# ICLOUD ON THE WEB



# ICLOUD WEB

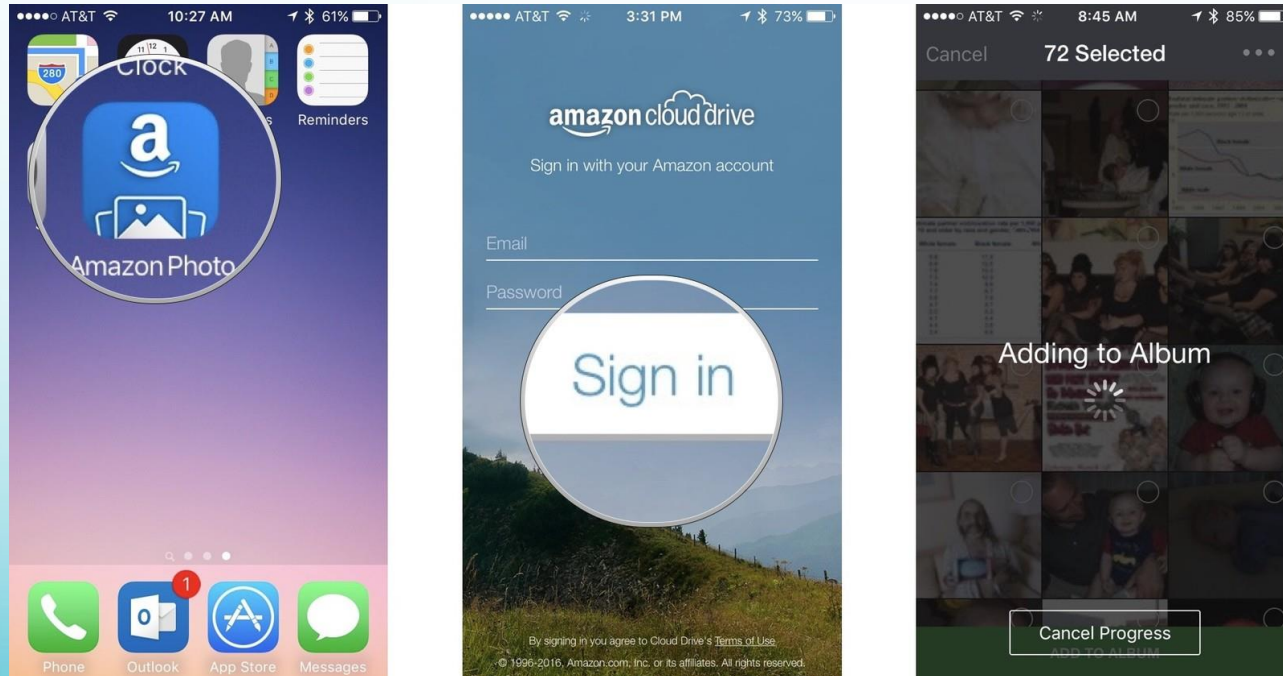
- Access high resolution version of the pictures and download



# MICROSOFT ONEDRIVE

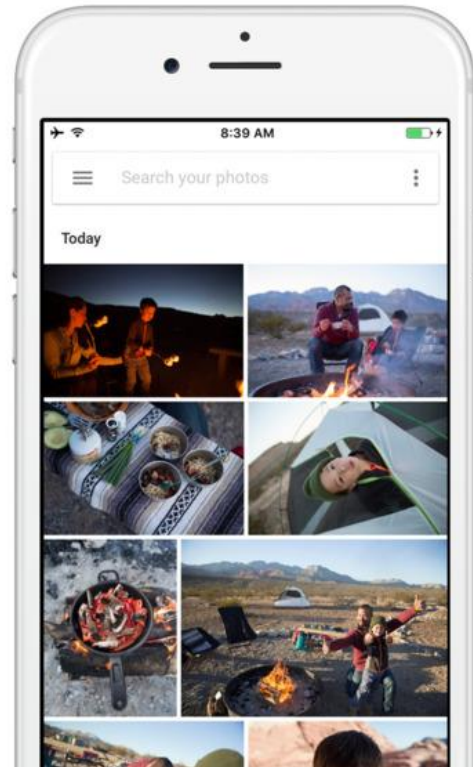


# AMAZON PHOTOS



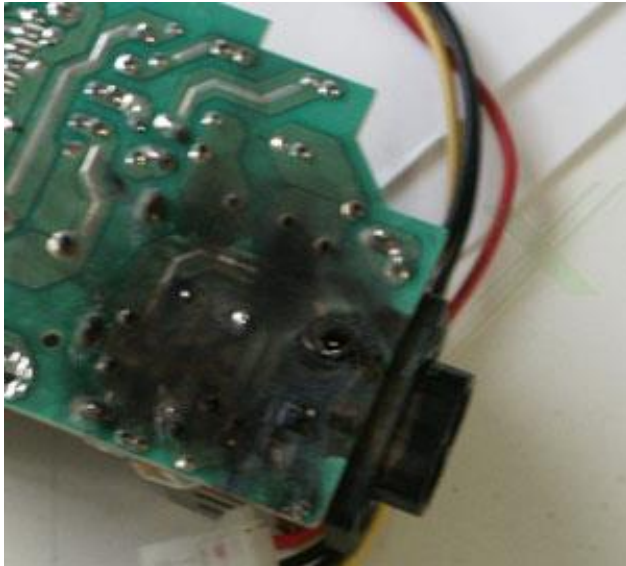
- Upload device photos to Amazon Photos
- Amazon photos for Windows and Mac
- Prime members get unlimited photo storage for free

Back up your photos &  
access them anywhere



## GOOGLE PHOTO APP

- Easy access from Google/Chrome ecosystem
- Additional storage can be purchased



## MOST LIKELY FAILURES

- Power supply (due to capacity aging)
- Disk Drive (due to mechanical failure)
- Solid state drives have no mechanical parts and to wait for spinning data. Faster and more reliable.



*"I back up my files religiously. I pray nothing happens to them."*

# BACKUP!!!

- Most asked question usually **AFTER** tragic situation
- Good news is the most tragedies can be corrected but at a great cost (my sister's recent recovery cost \$2,600 for 2TB for priceless photos)
- **Backup rule – always have at least 3 copies – your machine, somewhere else in your house, and in the cloud**





Roll over image to zoom in

Seagate

## Seagate Backup Plus Slim 2TB Portable External USB 3.0, Black (STDR2000100)

★★★★★ | 11,406 customer reviews | 1000+ answered questions

Was: \$79.99

With Deal: **\$69.99** ✓ Prime

FREE Pickup Today. [Details](#)

You Save: **\$10.00 (13%)**

**In Stock.**

Want it tomorrow, April 1? Order within **8 hrs 13 mins** and choose **Saturday** checkout. [Details](#)

Ships from and sold by Amazon.com. Gift-wrap available.

Capacity: **2TB**

1TB

1.5TB

**2TB**

4TB

4TB Fast

5TB

500GB

Color: **Black**



Service: **Get professional installation** [Details](#)

Include installation  
+ \$76.29

**Without expert installation**

# SOMEWHERE IN YOUR HOUSE

- Purchase a drive that comes with backup software
- USB connection
- Backup at least monthly
- Keep at least 2 months
- Seagate
- Western Digital



## CLOUD BACKUP

- Automatic
  - Mozy
  - Carbonite
- Manually
  - Amazon Drive
  - Microsoft OneDrive
  - Google Drive

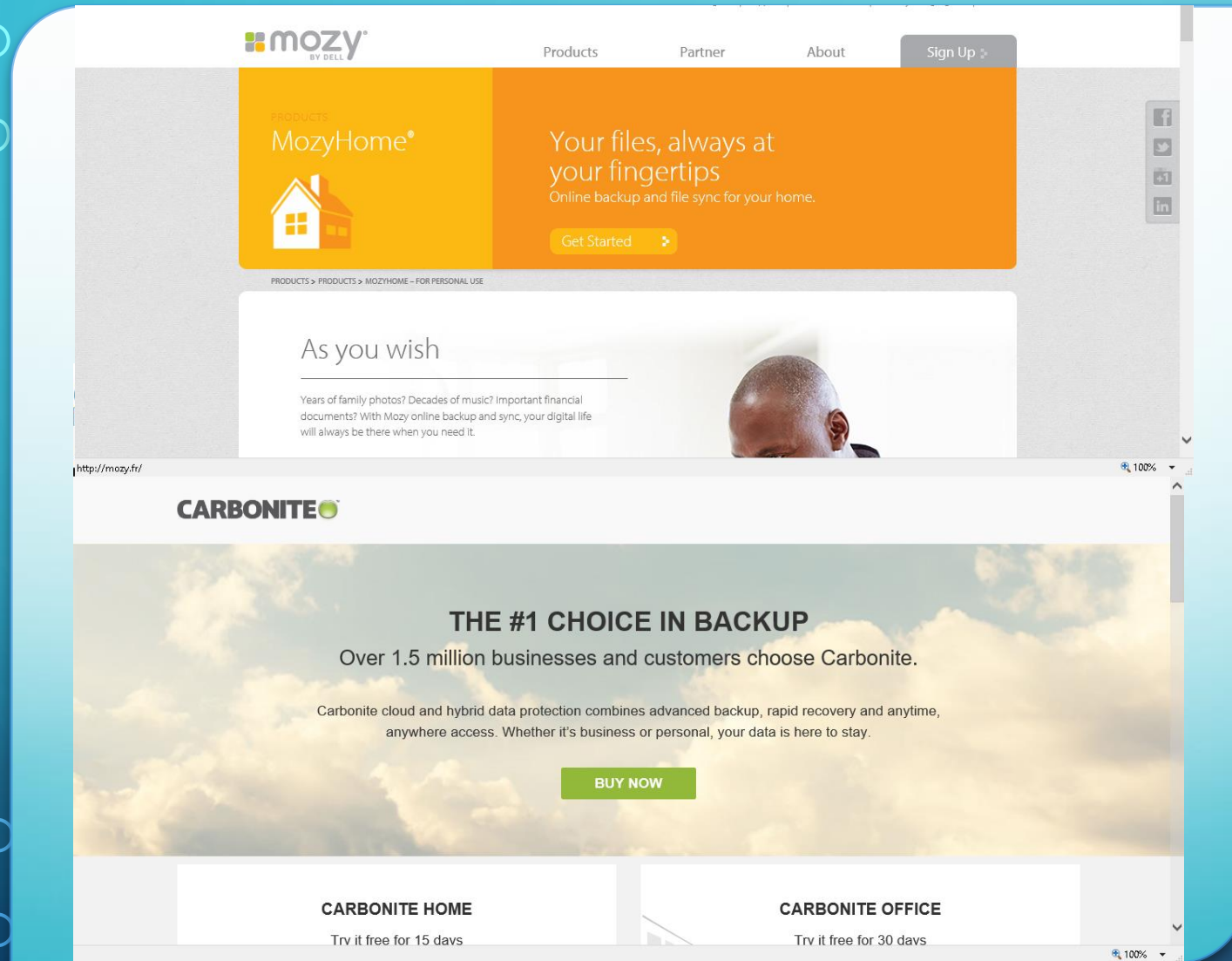
# AUTOMATICALLY IN THE CLOUD

Mozy

Carbonite

Copy only in the cloud

Reasonably priced but not cheap



The image shows two overlapping website screenshots. The top screenshot is for Mozy, featuring the Mozy logo (BY DELL) and navigation links for Products, Partner, About, and Sign Up. The main content area highlights 'MozyHome' with the tagline 'Your files, always at your fingertips' and 'Online backup and file sync for your home.' A 'Get Started' button is visible. Below this, a section titled 'As you wish' includes a photo of a man and text about digital life backup. The bottom screenshot is for Carbonite, showing the Carbonite logo and the headline 'THE #1 CHOICE IN BACKUP'. It states 'Over 1.5 million businesses and customers choose Carbonite.' and describes the service as 'Carbonite cloud and hybrid data protection'. A 'BUY NOW' button is present. At the bottom, two product options are listed: 'CARBONITE HOME' (15-day trial) and 'CARBONITE OFFICE' (30-day trial).

## MozyHome pricing

Choose the service level that covers your needs by subscribing to MozyHome on a monthly, annual, or biennial renewal schedule. Annual plans include a one-month-free discount, and biennial plans include a three-months-free discount. Bonus!

So what do you get for this price? The industry's most trusted online backup, file sync capabilities, web and mobile apps with anywhere access, and security standards that go beyond the norm. Additionally, Mozy is wholly owned by Dell EMC—a company built to last.

[Sign up](#)

**50**  
GB

**\$5.99/month**

1 computer  
1 year plan = 1 month free  
2 year plan = 3 months free

**125**  
GB

**\$9.99/month**

3 computers  
1 year plan = 1 month free  
2 year plan = 3 months free

### Not enough?

Add additional computers for \$2 per month per computer.  
Add an additional 20 GB of space for \$2 per month.

# MOZY

- Owned by Dell
- Data recorded in several data centers around the world
- All data centers are either SAS 70 or ISO 27001 certified and, where applicable, adhere to European Union Safe Harbor Privacy Principles.
- Option to store data using owner's private encrypted key (be careful!!!)
- PC and Mac and Mobile support

# CARBONITE WINDOWS

- Multiple US-only data centers
- Manual action required for files greater than 4GB
- Option to store data using owner's private encrypted key (be careful!!)
- PC and Mac and Mobile support

**CARBONITE** Pick the plan that meets your needs

**For Windows**  
Need plans for Mac?

	<b>BASIC</b> <b>\$59.99<sup>YR</sup></b> BUY BASIC	<b>PLUS</b> <b>\$99.99<sup>YR</sup></b> BUY PLUS	<b>PRIME</b> <b>\$149.99<sup>YR</sup></b> BUY PRIME
<b>FEATURES:</b>			
Unlimited cloud storage for 1 computer*	✓	✓	✓
Automatic & secure cloud backup	✓	✓	✓
Free U.S.-based support, 7 days / week	✓	✓	✓
Access files remotely	✓	✓	✓
External hard drive backup		✓	✓
Mirror image backup ⓘ		✓	✓
Automatic video backup			✓
Courier recovery service ⓘ			✓
	BUY BASIC FOR WINDOWS	BUY PLUS FOR WINDOWS	BUY PRIME FOR WINDOWS

SYSTEM REQUIREMENTS: Windows 7, 8 Or 10. Need Plans for Mac?

# MANUALLY WITH AMAZON DRIVE



The screenshot shows the Amazon Drive website homepage. At the top left is the 'amazon drive' logo. To the right are navigation links: 'Welcome', 'Learn More', 'App Gallery', and 'Hello, Sign In' with a dropdown arrow. The main heading reads 'Unlimited Secure Storage from Amazon'. Below this are two promotional cards. The first card, 'Prime Photos', features an illustration of a computer monitor, a smartphone, and a stack of photos. The second card, 'Unlimited Storage', features an illustration of a blue storage box overflowing with files. A zoom level of '100%' is visible in the bottom right corner of the screenshot.

amazon drive

Welcome Learn More App Gallery | Hello, Sign In

## Unlimited Secure Storage from Amazon

### Prime Photos

- Unlimited storage for photos
- 5 GB for videos, music, and other files
- Free apps for your devices

### Unlimited Storage

- For photos, videos, music, documents, and more
- Accessible via phone, tablet, or computer
- Safe and private with Amazon security

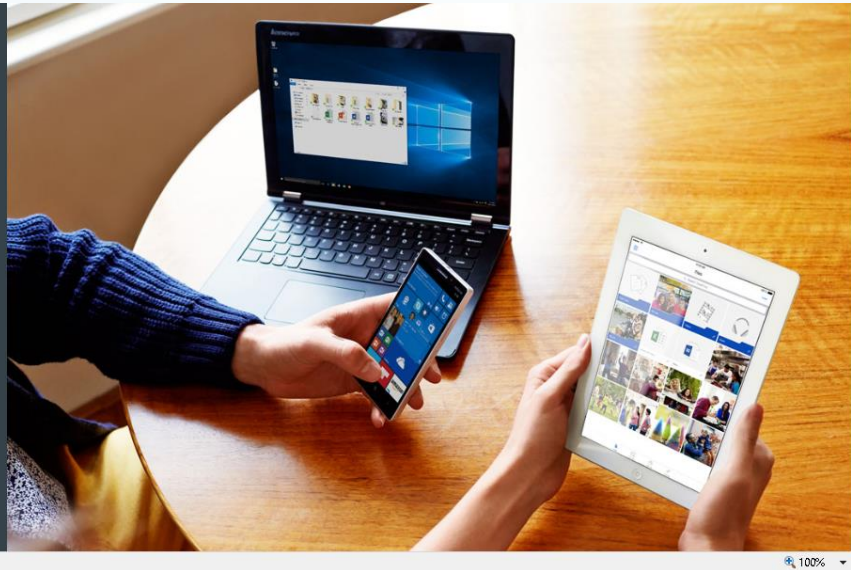
100%

- Prime members get unlimited file storage for free
- Unlimited everything for \$59.95/year
- Copy in the cloud only
- Requires manual uploading
- Very effective and very inexpensive



Any device, at any time

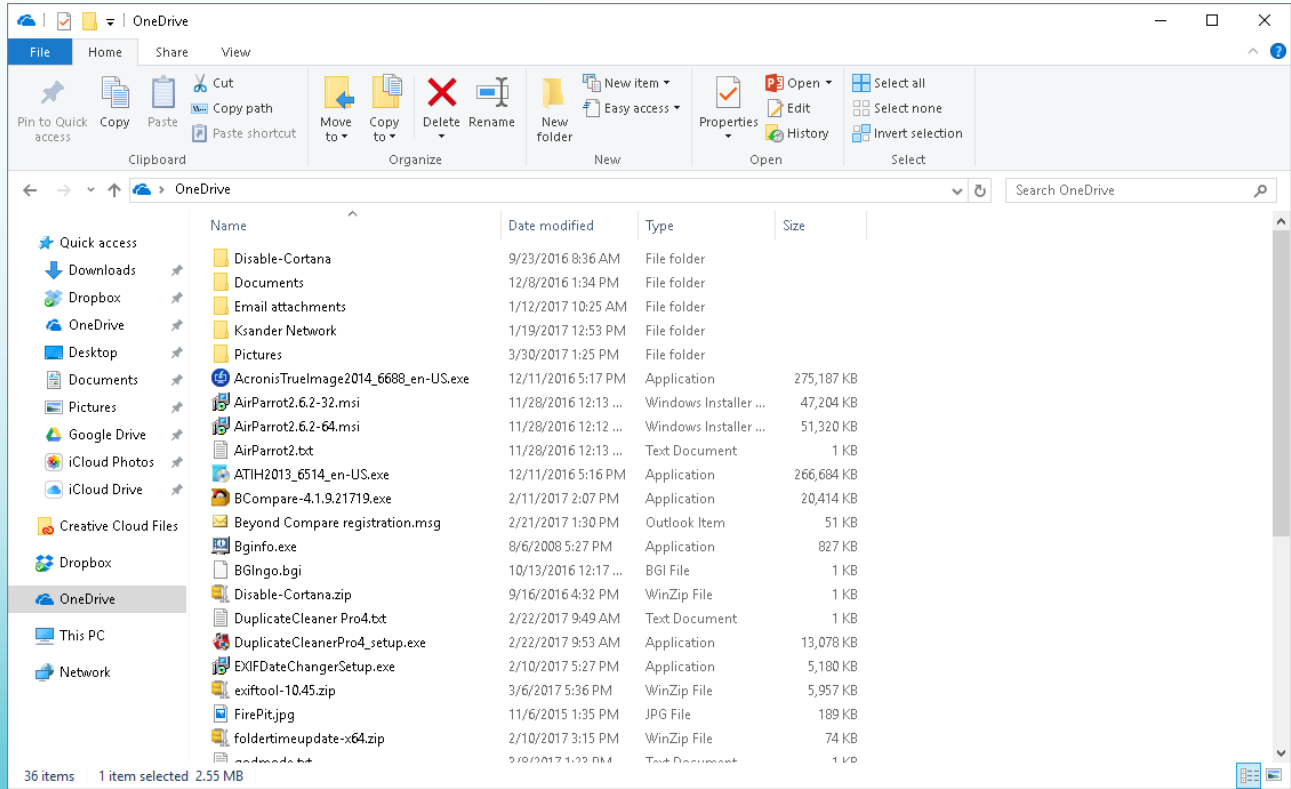
OneDrive is pre-installed on Windows 10, and it works well on all your devices. Access and share files and photos on PC, Mac, Android and iOS.



## MANUALLY WITH MICROSOFT ONEDRIVE

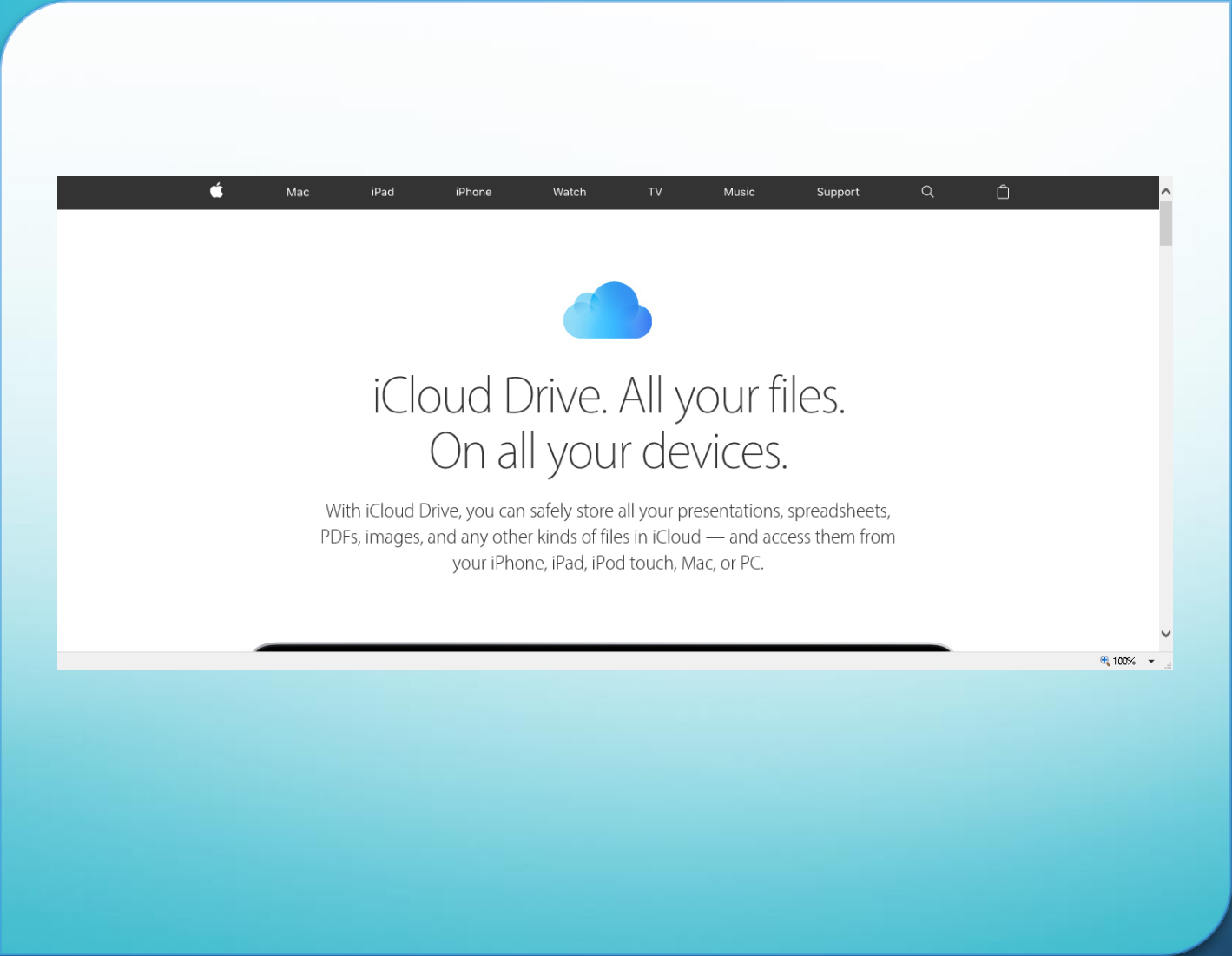
- Microsoft version on iCloud
- Pre-installed on Win 10
- Only requires copying file to OneDrive folder
- Copy in the cloud and on each machine with Onedrive
- Additional storage can be purchased

# MICROSOFT ONEDRIVE

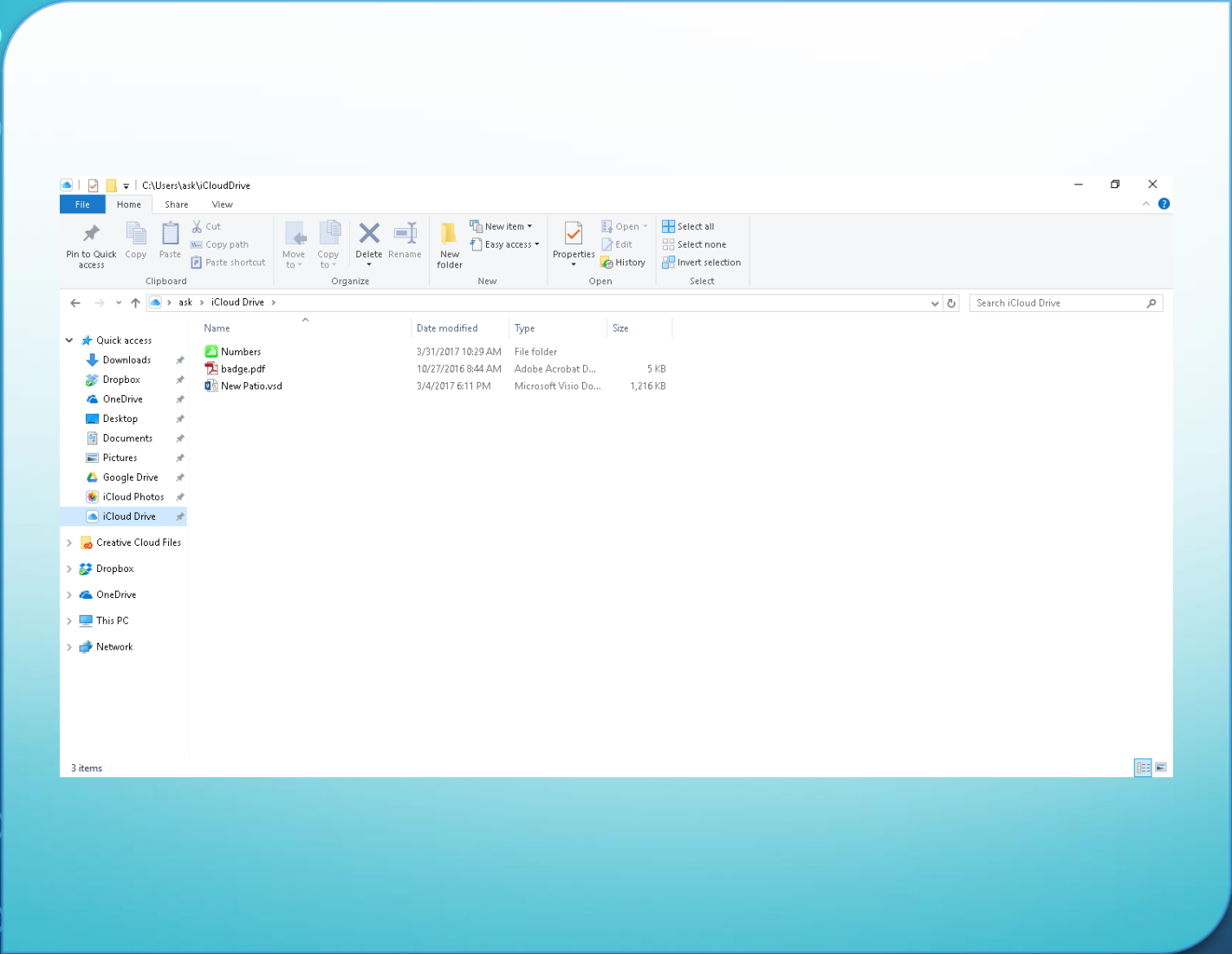




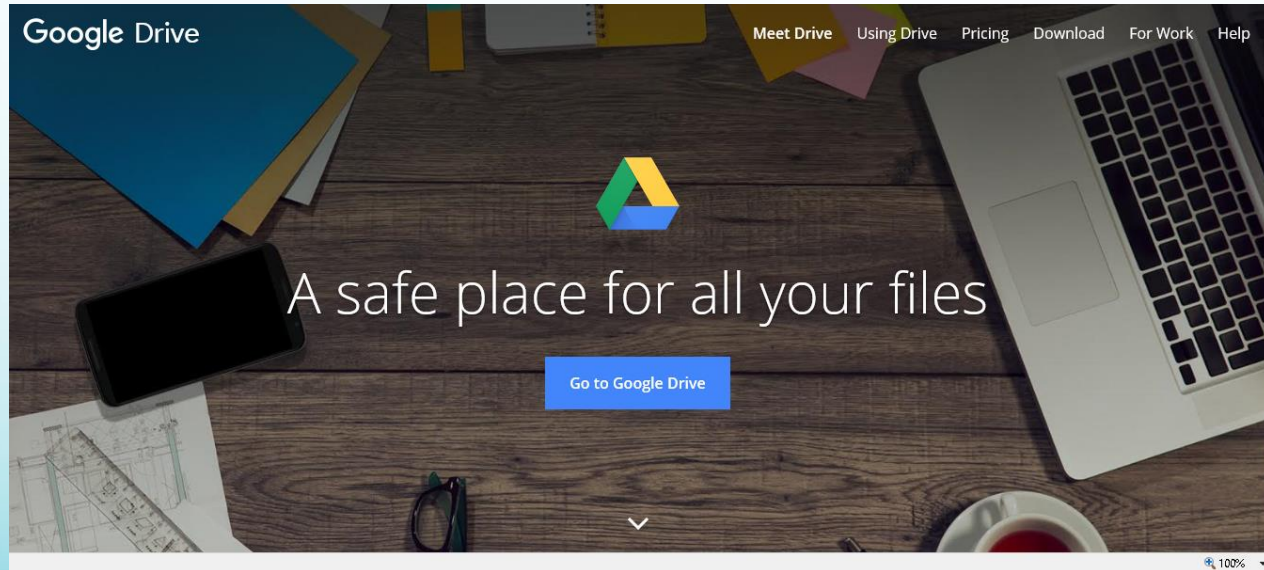
# ICLOUD DRIVE



# ICLOUD DRIVE

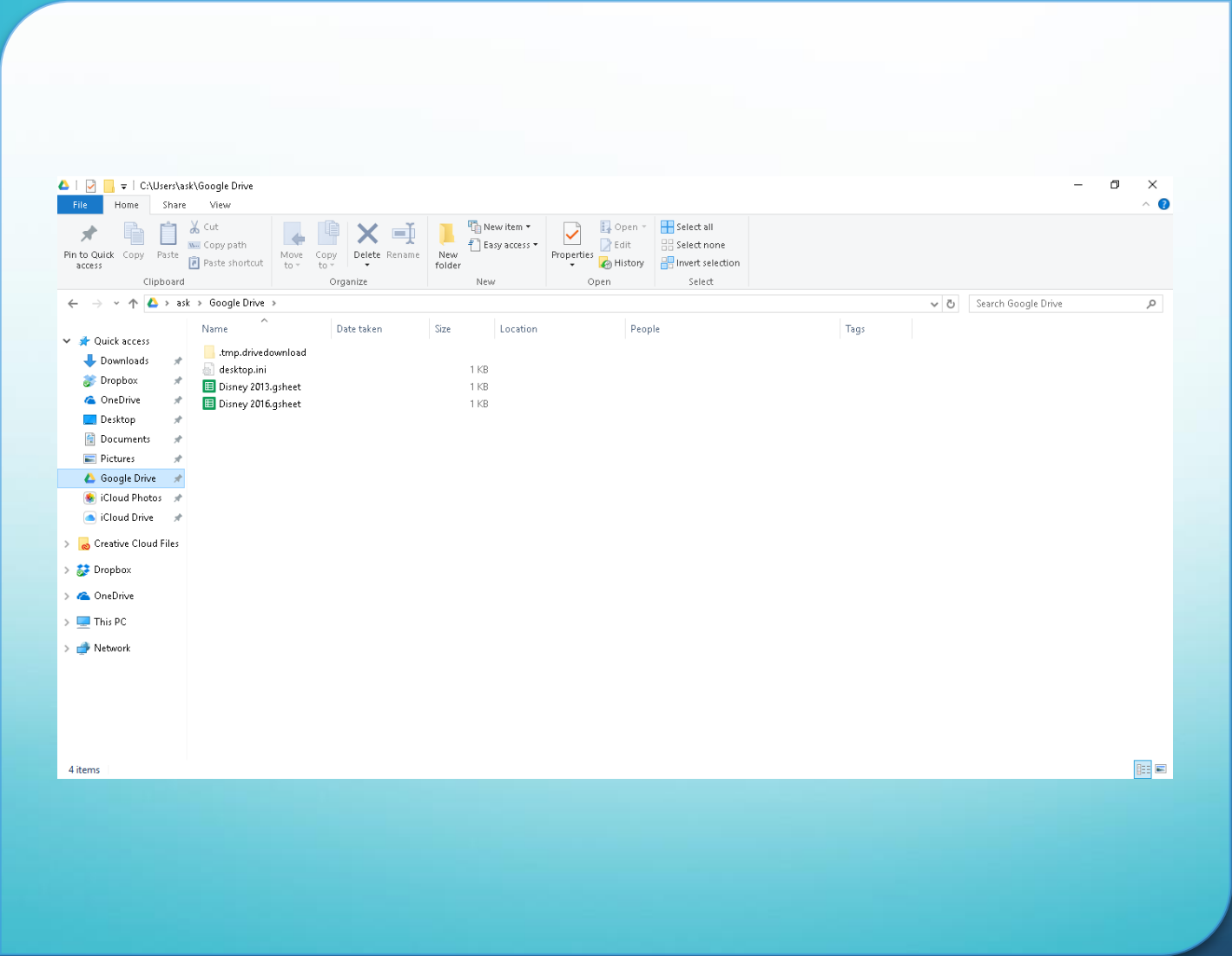


## MANUALLY WITH GOOGLE DRIVE



- Only requires copying files to Google Drive folder
- Copy in the cloud and on each machine with Google Drive
- Additional storage can be purchased

# GOOGLE DRIVE



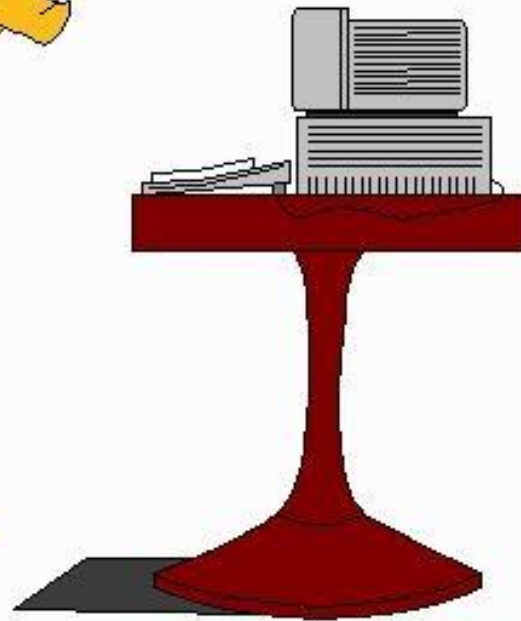
# COST

	Apple	Amazon	Google	Microsoft
<b>Name</b>	iCloud	Amazon Cloud Drive	Google Drive	OneDrive
<b>Free tier</b>	5GB	None	15GB	15GB
<b>Unlimited photos</b>		\$11.99 per year (Prime users get this free, plus 5GB for other files)	Free (photos above 16MP downsampled)	
<b>Unlimited files</b>		<b>\$59.99 per year</b>		
<b>50GB</b>	\$0.99 per month			
<b>100GB</b>			\$1.99 per month	\$1.99 per month
<b>200GB</b>	\$2.99 per month			\$3.99 per month
<b>1TB</b>	\$9.99 per month		\$9.99	<b>\$6.99 per month</b> (includes Office 365 subscription)

Table 1: Data storage options available at Purdue: <http://guides.lib.purdue.edu/DataStorage>

PURR	OneDrive/ Office 365	Syncplicity/ Boiler Backpack	Data Depot	Fortress Archive	Dropbox Basic
Web/Hubzero	Microsoft Cloud storage	Syncplicity Cloud storage	File system	Tape	Cloud storage
Project work space; Data publication; data curation; Group oriented	Storage; Individually oriented	Storage; Group oriented	Storage and services, including data transfer, file structure, and tools. Group oriented	Data archive for long term storage; Individually oriented; Group sites created upon request	Enterprise and individual file storage system
You/Purdue	Unclear	You and Purdue	Purdue/Research group lead faculty	You/Purdue; Purdue/Research group lead faculty for group space	You
No	Yes	Yes	No	No	Yes
Optimized for collaboration, publication and preservation of mid-sized datasets		Purdue affiliates, optimized for individual file storage	Optimized for data transfer, volume, and reliability on HPC systems and beyond	Optimized for high- performance, long-term data storage.	General public, business accounts
10 GB free for 3 years; 100 GB for 10 years with grant; Extra project space is \$1.08 per GB	Available to students with tuition	Free	100 GB free trial option; Purchase in TB increments, currently \$ 150 per TB per year	Free with purchase of Data Depot or Community Clusters	Free for basic; Can upgrade for enhanced features
	1 TB	100 GB	No upper limit; Total storage capacity: 2.25 PB	No upper limit; Total storage capacity; 10 PB	2 GB
Non-HIPAA sensitive data	Do NOT use for sensitive data	No expectation of privacy	Non-HIPAA sensitive data with IRB		Do NOT use for sensitive data
Uses Globus to transfer data to HPC systems	No	No	Depot is mounted directly on HPC clusters using GPFS. Data to and from Depot can use Globus for transfer. Personal and lab computers on campus can also transfer files with	Uses Globus or HSI/HTAR to transfer data.	Not available from HPC systems. Can transfer files from computers using Dropbox applications, but no transfers to servers

[HTTP://GUIDES.LIB.PURDUE.EDU/DATASTORAGE](http://guides.lib.purdue.edu/DataStorage)



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ELVIS LEAVES THE  
BUILDING?