Core OS Networking

Overview

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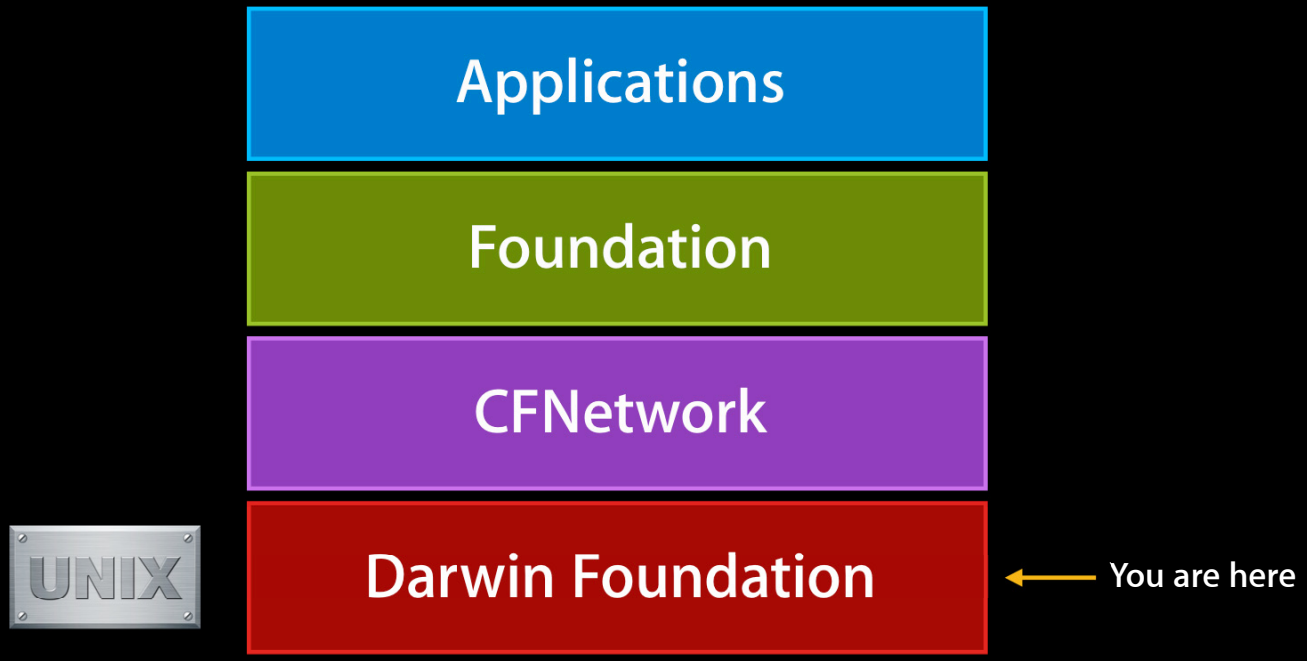
The Evolution of Networking…

Core OS Networking



New for iOS 4

IPv6

One year, one month, 28 days left…

- New support, stack synchronized with Snow Leopard
- Automatically obtains IPv6 prefix/address via router advertisement
- DHCPv6 (stateless) for DNS server addresses, search domains, etc.
- Most apps IPv6 ready to go!

IPv6

One year, one month, 27 days left…

- Stack, socket interface, CFNetwork IPv6 ready
- If you're using CFNetwork, you may be done!
  - Test your app with v6
- If you're not using CFNetwork, be aware!
  - Check your "older" source code

IPv6

One year, one month, 26 days left…

- Write code for address independence
  - Be aware of displaying/storing IP addresses, may be 128bits now
  - Use address independent hostname lookups (`getaddrinfo`)
    Expect multiple addresses (some IPv4, some IPv6)
  - Use `sockaddrs` NOT `in_addr/in6_addr`

    Reorder `socket / gethostbyname / connect`
    to `getaddrinfo / socket / connect`
  - If your app listens for connections, listen for IPv6 only
  - Avoid using functions/structures that are IPv4 specific

Captive Networks

- What is a captive network?
- OS detects and remembers captive networks
- Wi-Fi interface is unavailable while captive
- New support for Hotspot management apps

SSL VPN

- Cisco and Juniper clients
- OS Level plumbing
- Vendor specific feature sets
- Available via the App Store

Multitasking

Networking behavior for background apps

- When suspended:
  - Networking sockets will persist for an arbitrary time
  - System may reclaim resources associated with socket
- Be sure to respond to "going to background" notification
- Respond to networking errors
- Read the documentation for various use-cases (e.g., VoIP)
- See sessions:
  - Adopting Multitasking on iPhone OS, Part 1
  - Adopting Multitasking on iPhone OS, Part 2
  - Simplifying Networking Using Bonjour

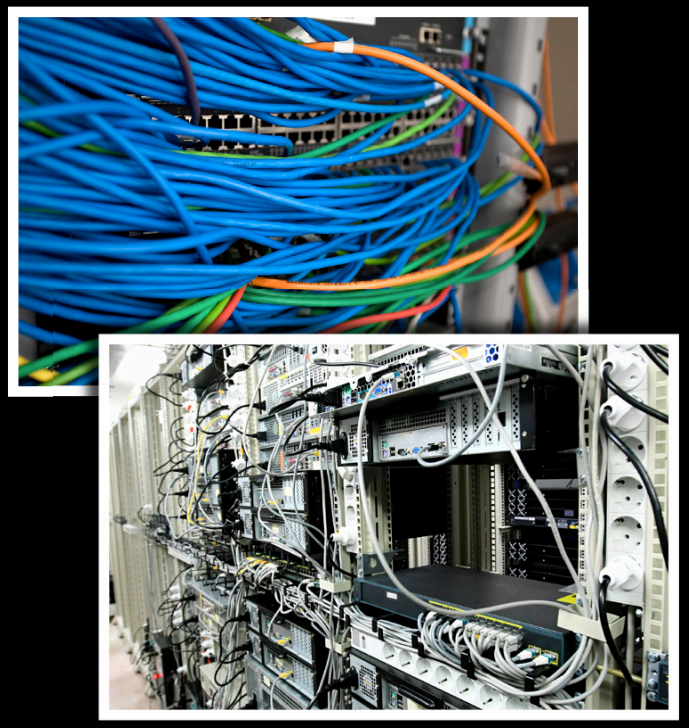

3G
9:41 AM
Messages
Calendar
Photos
Camera
YouTube
Stocks
Maps
Weather
Notes
Utilities
iTunes
App Store
Settings
Phone
Mail
Safari
iPod
iPad
9:41 AM
Calendar
Contacts
Notes
Maps
Videos
YouTube
iTunes
App Store
Settings
Safari
Mail
Photos
iPod

Today's Challenge

- 225,000+ apps
- Significant percentage are network enabled
- Mobility isn't the exception, it's the norm

Networking Used to Be Static…

- System administrators configured everything
- Total control of your local networking environment



Nothing Is Static Anymore

- Network configuration is completely dynamic and can be assumed to change
- At any time and for virtually any reason
  - Signal strength
  - Cell availability
  - Wi-Fi availability
    - Public and private Wi-Fi environments
  - VPN connectivity

What Networking Feels Like for the User…

Networking Top 10

Things to remember while writing the next great app…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Don’t Assume Network Is Free

- Usage may be charged by time or amount
- 3G and/or Wi-Fi may be fee-based
- 3G may be roaming
- Transmit only what you need to
- Cache intelligently


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Robustly Deal with Network Errors

- Connections will go down…be prepared
- Packets will get dropped
- Timeouts will occur
- Respond to backgrounding intelligently
  - Close things down that you can


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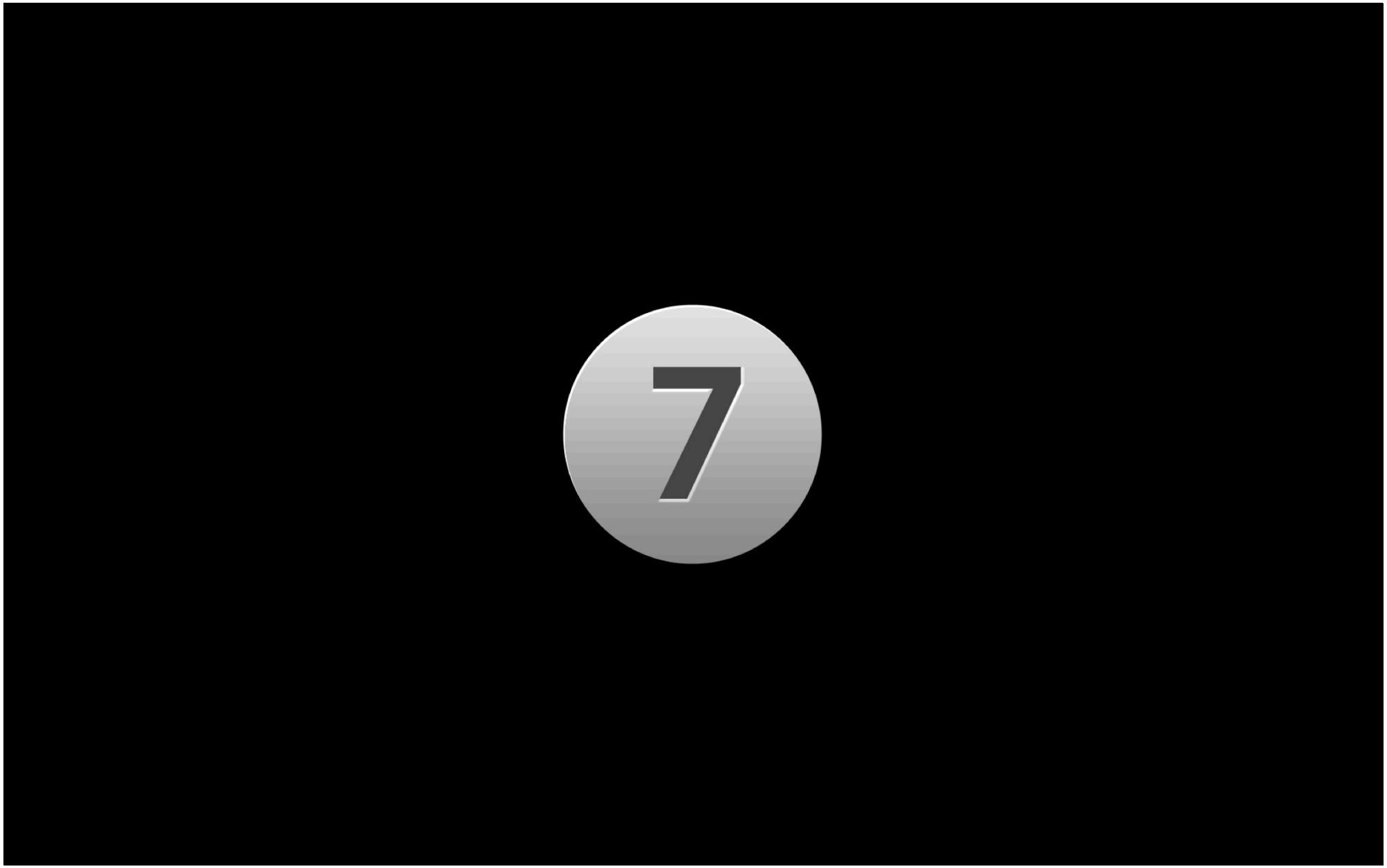
Networking Is Asynchronous by Definition

- Do NOT put synchronous calls on main thread
  - Your app will get shot!
- Event-driven APIs give a better experience
  - (e.g., Bonjour, Foundation APIs using RunLoop event sources, etc.)
- UI should reflect this reality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Link Quality Is Completely Variable

- Wi-Fi
- 3G
- Layered networks (Wi-Fi on cellular or worse)
- Expect changes in
  - Speed
  - Latency
  - Packet loss


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Deal with No-Network Conditions

- Network won't always be available
- Might go away at any time
- Your app should behave intelligently… gracefully


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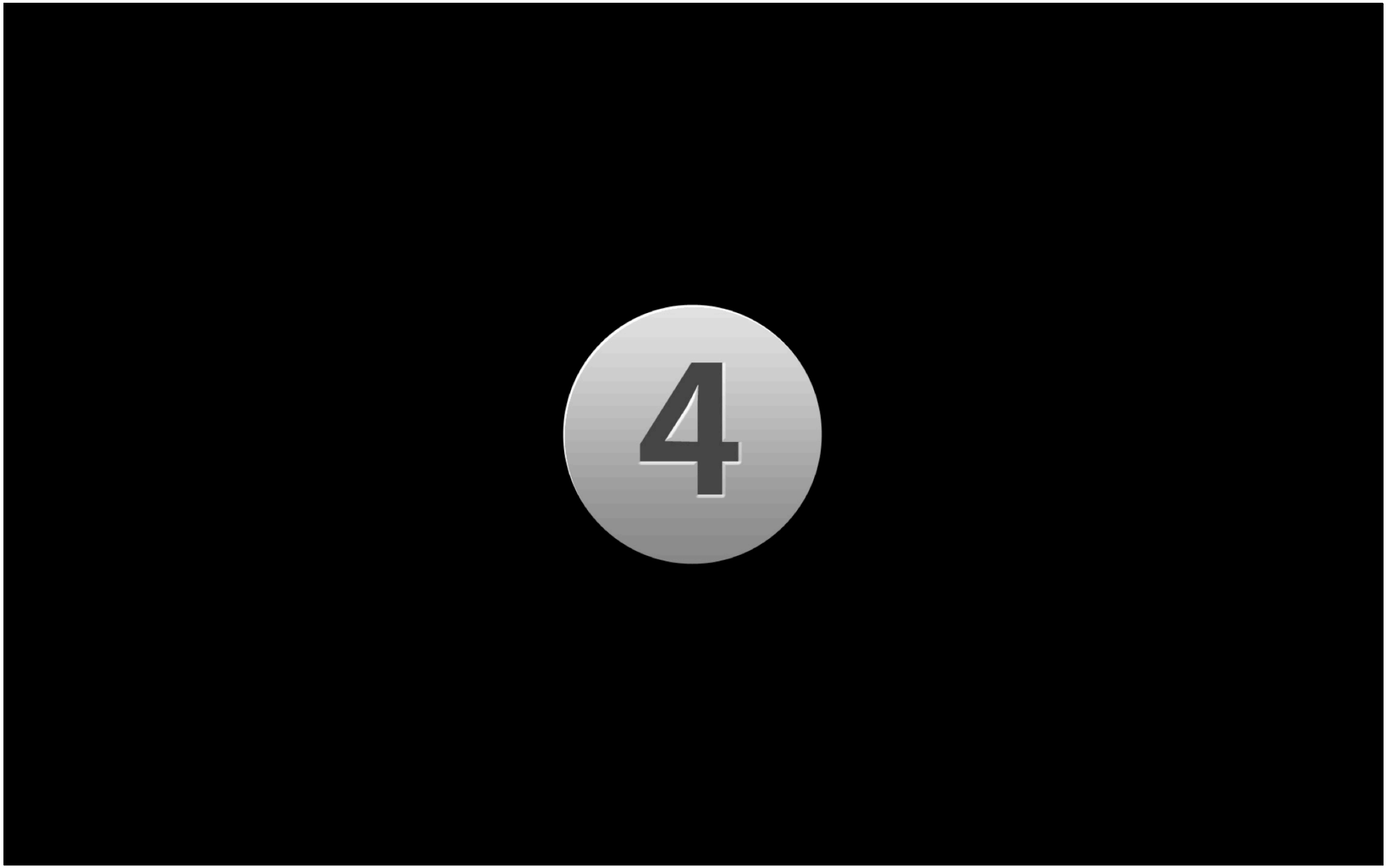
Assume Network Is Insecure

- May be using public Wi-Fi, Hotspots, etc.
  - Might even be using spoofed network
- Do not transmit user information in the clear
- Use end-to-end security, Transport Level Security (TLS), whenever possible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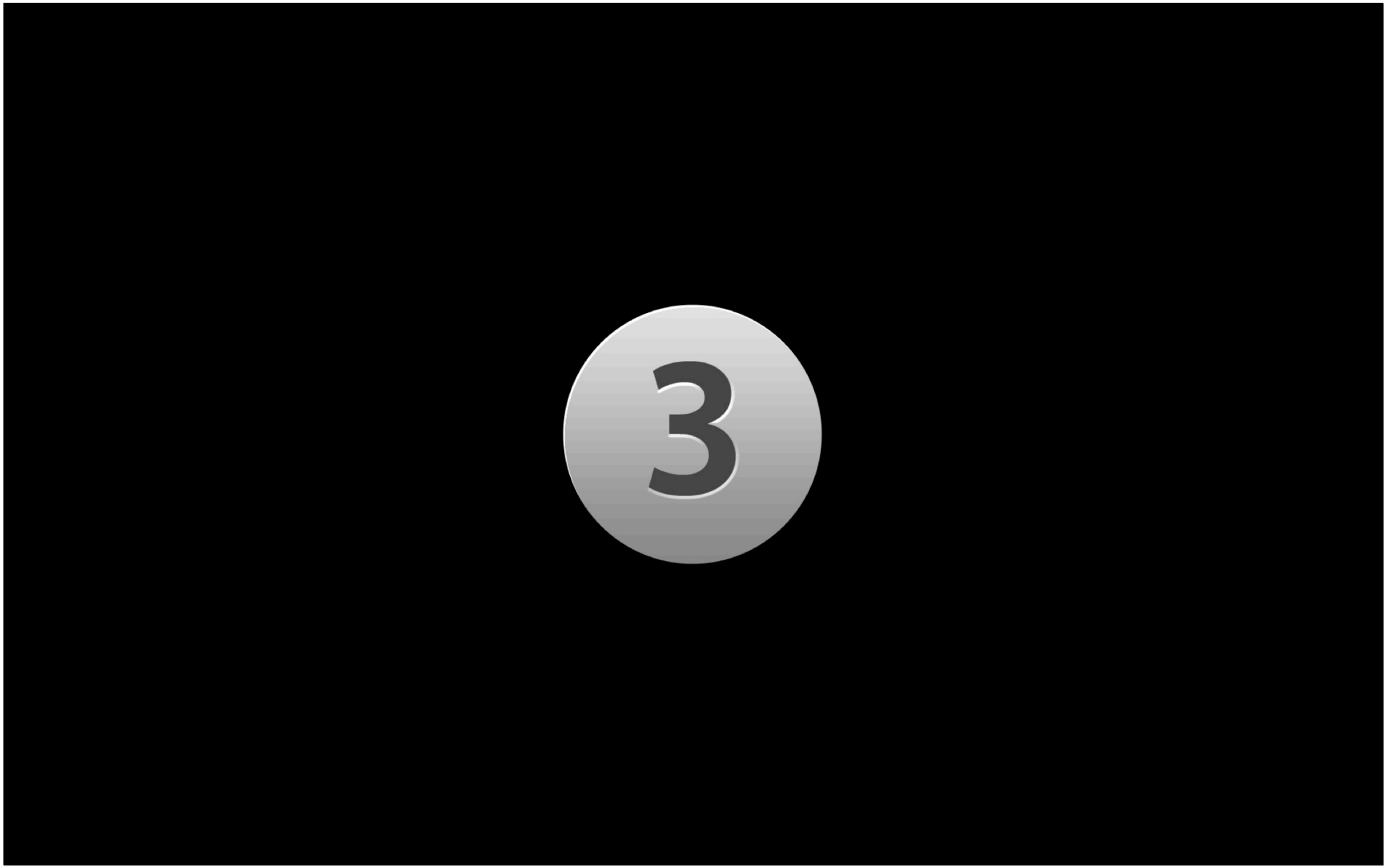
Be IPv4/6 Agnostic

- Use CFNetwork and higher, when possible
- Don’t assume address types or sizes
- Be prepared for multiple DNS address resolution responses
- Check open source and older code for v6 compatibility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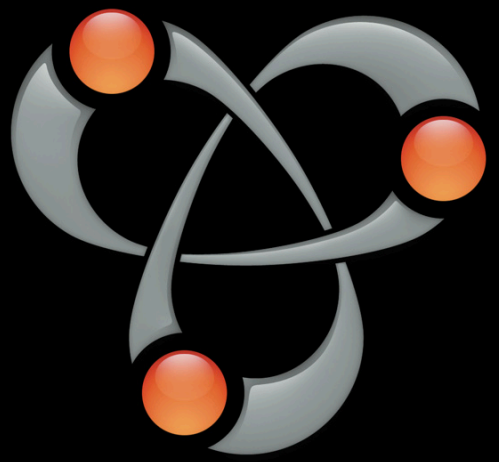
Use Bonjour to Advertise and Find Services

- It's a dynamic world; nobody remembers IP addresses
- Can you remember your IPv6 address? (2001:0200:0000:8002:0203:47ff:fea5:3085)
- Bonjour provides service advertisement, browsing, and resolving APIs
- Peer-to-peer
- On desktop OS, Bonjour also provides sleep proxy support
- See session:
  - Simplifying Networking Using Bonjour

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Power Is as Important as Performance

- Portability means batteries
- Don’t power up the radio(s) more than you need to
- Use push notifications
- Sleep proxy support helps on Snow Leopard


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Assume Change at Any Time

- Anything can and WILL change
  - Available interfaces
  - Signal strength and quality
- Don't leave connections open longer than necessary
- Use Reachability APIs
  - NOT a preflight check
  - Change notifications

Related Sessions

Simplifying Networking Using Bonjour	Nob Hill Wednesday 10:15AM
Network Apps for iPhone OS, Part 1	Pacific Heights Wednesday 2:00PM
Network Apps for iPhone OS, Part 2	Marina Wednesday 3:15PM
Adopting Multitasking on iPhone OS, Part 1	Presidio Tuesday 11:30AM
Adopting Multitasking on iPhone OS, Part 2	Mission Tuesday 3:15PM

Labs

Networking Lab	Core OS Lab A Tuesday 4:30PM
Networking Lab	Core OS Lab B Wednesday 9:00AM
Networking Lab	Core OS Lab B Thursday 9:00AM

Summary

- Networked apps add value for your customers
- They expect a “connected” experience
- Be prepared for the challenges of the mobile world

Q&A

More Information

Paul Danbold
Evangelist
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Documentation
Networking
http://developer.apple.com/networking/

Apple Developer Forums
http://devforums.apple.com

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WWDC10

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