Mobile Security
Fall 2015

Patrick Tague

#1: Course Introduction

Class #1

- Brief overview of the course
- Logistics
- Course information
- Talk about projects (if there's time)

What is this course all about?

Time for a Quiz!

What is Mobile Security?

- or -

What makes security different in the mobile space?

What is Mobile Security?

- Protocols are different from Internet / Ethernet
- Devices are much more ubiquitous / varied
- Issues with resource constraints
- OSes are different across the ecosystem and compared to prev technologies (e.g., laptops)
- App dev / dist is different compared to laptop class
- Lots of sensitive data (e.g., location history, contacts)
- Wide variety of network technologies
- Mobility creates lots of opportunity for dynamics which causes problems
- Physical security !!!
- Entering passwords is horribly difficult
- Different kinds of users
- Controlling access to data across applications / services
- Attack surface is bigger
- Configuration is more opaque
- Lots of players involved (e.g., telecom) slow updates/patches
- Cable for charging and data transmission is the same
- Quantity of data may be limited due to mobile plan
- Lots of companies collecting and managing lots of user data

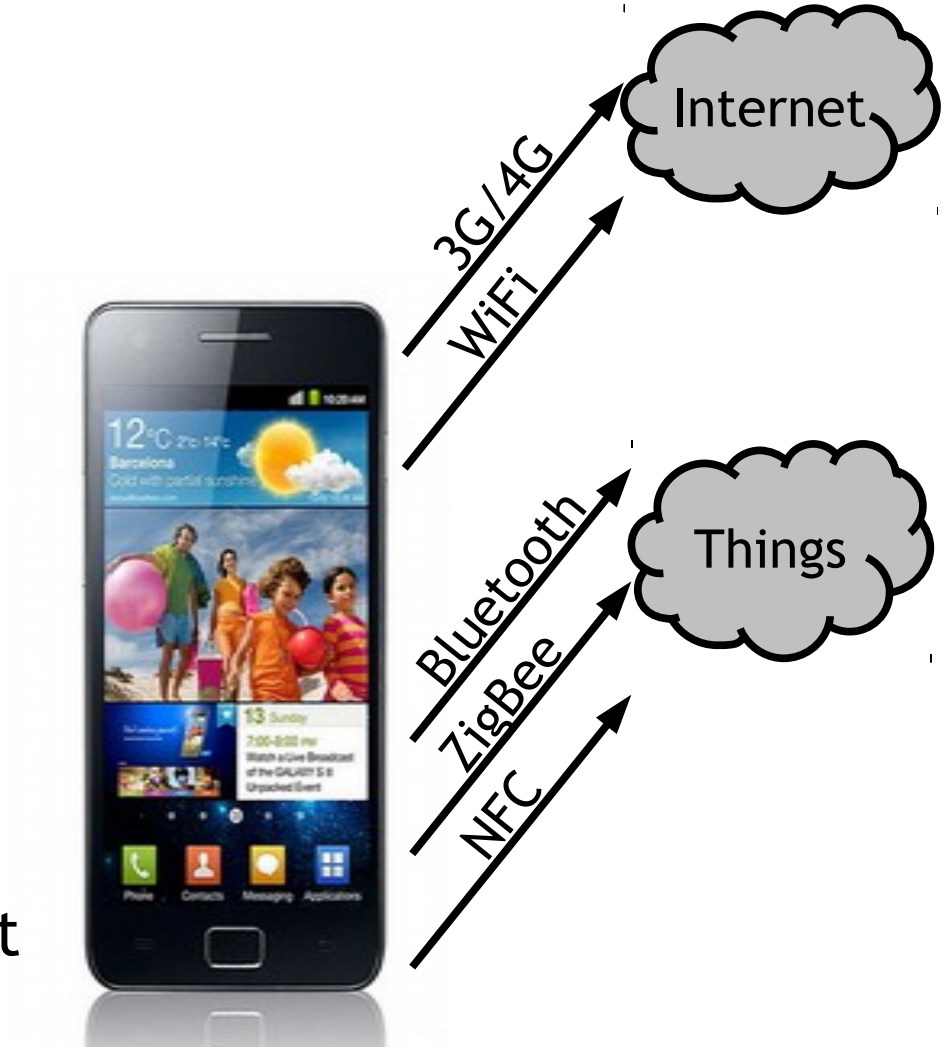
Mobile Security Topics

- In the Mobile Security course, we'll study:
  - Smartphone systems
    - Apps, services, etc.
  - Networks they use
  - External services they rely on
  - Security/privacy issues faced by users, devs, regulators, …
  - Trade-offs re: usability, efficiency, etc.

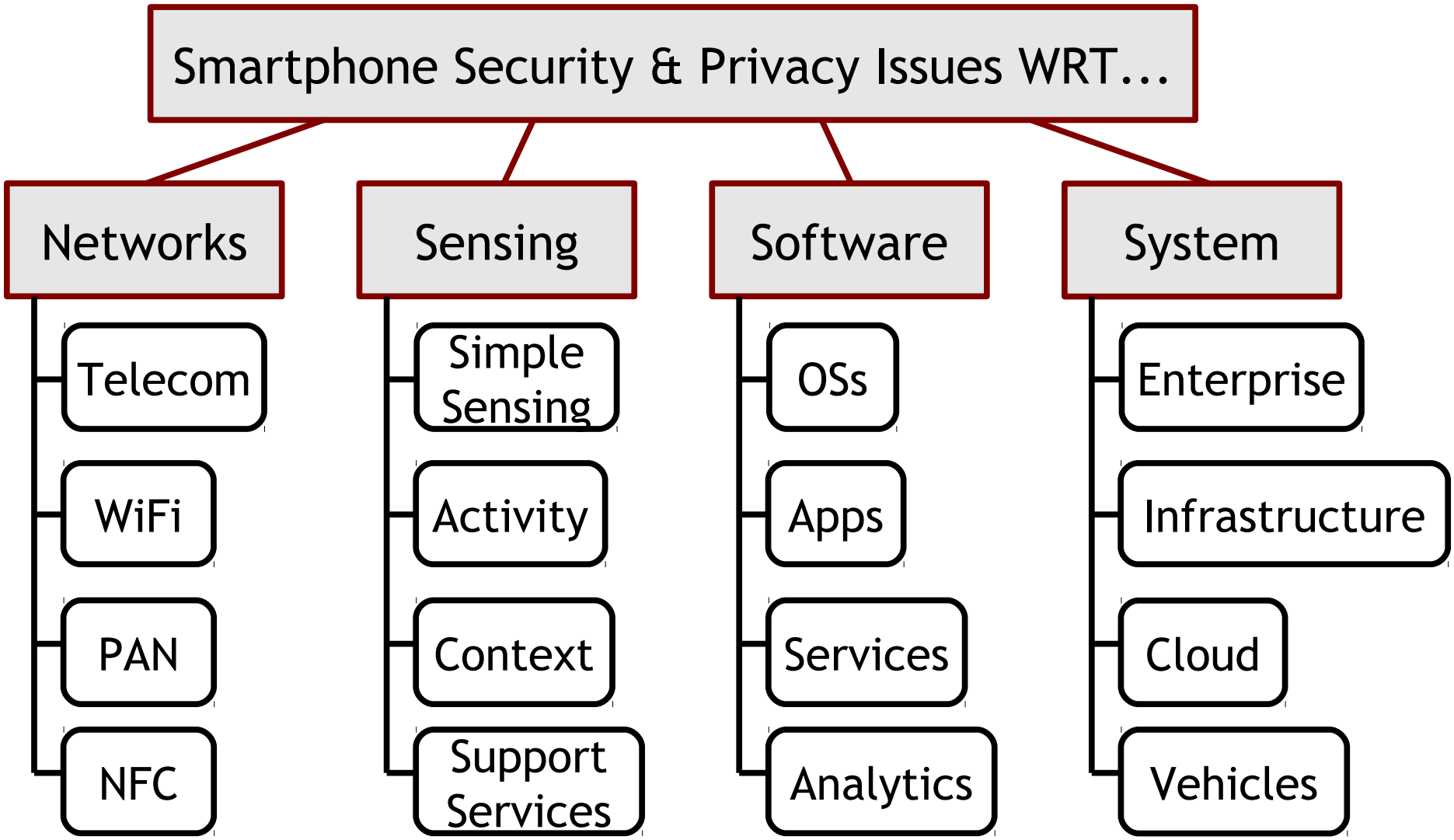
Course Objectives

- Security & Privacy for Mobile System & App Developers

- Exploration and critical analysis of security and privacy issues in mobile systems
  - What are some security concerns in mobile devices?
  - What can devs do to protect customers and themselves?



Topic Roadmap



Goals of the Course

- Understand how to design secure applications and services in the mobile space

- Know what the infrastructure provides and what the developer must consider

- Hands-on experience in analysis and design of security-centric apps, services, protocols, etc.

- Cutting-edge research/project experience

What This Course is NOT...

- Crypto or basic InfoSec course
  - Take something like 18-631 / 14-741 instead
- Android / iOS development course
  - Take something like 18-641 instead
- Easy.

Questions about Content?

Any questions about content, focus, etc. before I start talking logistics...?

Logistics

Course Website

http://mews.sv.cmu.edu/teaching/14829/f15/

Prerequisites & Assumptions

- This course has official prereqs
  - You have taken a graduate-level **Information Security** course (e.g., 14-741, 18-631, 18-730)
  - You have taken a graduate-level **Networking** course (e.g., 14-740, 18-756, 15-641)
- In addition, we assume:
  - You are **proficient in Java** programming and either have **experience with Android** or have time to **learn it on your own** ***(HW#1 requires Android knowledge)***
  - IMPORTANT: this course does not teach Android dev

Registration

- This course has 4 concurrent sections
  - **It's important that you register for the right one**

		If your home dept is: ECE	If your home dept is: Not ECE
If your location is:	Pgh	18638 A	14829 A
	SV	18638 SV	14829 SV

Waitlists

- If you're currently registered for this class, but not planning to stay: **please drop**

- If you're currently on the waitlist:
  1) Make sure you're on the correct waitlist (see the previous slide)
  2) Send me an email (tague@cmu.edu) detailing:
     1) **What year/term** of your program are you in (priority will go to students closer to graduation)?
     2) **What degree requirements** does this course fulfill (priority will go to students who need this course)?
     3) **Why** you want to take this course?
     4) **What prereqs/qualifications** do you have?

Deliverables & Grading

- Individual work – **30%**
  - Four assignments
    - **Late submission: 10%/day penalty, up to 2 days**
- Group project
  - Four presentations (proposal, statement of work, progress update, final) – **25%**
    - **Graded individually, everyone must participate**
  - Two written reports (SoW, final paper) – **25%**
    - **No late submissions accepted**
- Exam – **20%**

Individual Assignments

- Four assignments
  - Programming/app development component
  - Research/survey component
  - Assignments will use Android, some dev tools, and some analysis tools
- Assignment details and deadlines will be online
- Individual → each student is responsible for doing their own work
  - Discussion is encouraged, but **work is individual**

Group Project

- Project details:
  - Teams of 3-4 students
  - Some teams will work on “sponsored projects”, others will create their own projects
  - Background/proposal will be in late September, so form teams and get started soon
  - Statement of Work and milestone presentation in mid October
  - Progress report in early November
  - Final presentation in early December
  - Final report due December 17

Exam

- Individual in-class exam
- Format and style to be announced
- About ¾ through semester, tentatively 11/17

Important Dates

All important dates are on the course website

How to Contact Us

- Instructor: Patrick Tague
  - **Email: tague@cmu.edu**
  - Office: B23 218
  - Phone: 650-335-2827
  - **Skype: ptague**
  - Office hours: Open-door, open-calendar, by appt
    - Public Google calendar: **http://goo.gl/FIVbRK**

Best: find times on my calendar, email to request a meeting (in person, Skype, phone, etc.)

- TAs: Nandita Joshi
  - Email: **nandita.joshi@sv.cmu.edu**
  - Office hours and other details TBD (see web)

Some Syllabus-type Details

- Class meetings:
  - Tues/Thurs 9:00-10:20am PDT / 12:00-1:20pm EDT
  - B23 118 @ SV campus, CIC 1201 @ Pgh campus
- Class website
  - Schedule, slides, assignments, papers, projects, …
  - Submissions are via Blackboard
- Textbooks
  - **None**, but some references are on the website
- Assigned reading
  - Papers, blog posts, media, etc.

Assigned Reading

- Between class readings, homework assignments, and project, ***you'll be reading a lot of papers!***
  - Don't be surprised to see 100+ pages of reading/week
  - Reading research papers is not like reading textbooks, they're much more forgiving and can be read efficiently
  - **Hint**: read the pamphlet posted for reading material today
    - We'll also take some time in an upcoming class to talk about how to read efficiently.

Important Policies

- **Academic Integrity:** all students are expected to adhere to academic integrity policies set forth by CMU, CIT, ECE, INI, etc. See
  - ECE Academic Integrity Policy (and handbook)
  - INI Student Handbook
  - College of Engineering Policies
  - CMU Academic Integrity Policy
- **My Collaboration Policy**: discussion is encouraged, but **assignments must be done individually**
  - Copying is cheating, cheating → failing grade
- **Plagiarism**: no copying, attribute ***all*** content sources
- **My Wiki Policy**: if you cite Wikipedia (or similar) pages directly, you will fail the assignment/deliverable
- **Re-grading**: on a case-by-case basis, contact me

Ethics of S&P Work

- Research, development, and experimentation with sensitive information, attack protocols, misbehavior, etc. should be performed with the utmost care

- You are expected to follow a strict ethical code, especially when dealing with potentially sensitive information

- If anything is unclear, ask before going forward

Questions about Logistics?

Any questions about course logistics?

Feel free to email later.

Assignment #1

- Not a programming assignment, but requires knowledge of how Android works

- Due on **September 15** (via BB)

- Tasks:
  - Read some papers about intent-based attacks in Android
  - Design a malicious app based on what you read
    - Building the app is optional
  - Do a nice write-up of your design

Projects

What topic should I choose?

Project Topics

- Projects must:
  - Relate to topics covered in class and focus on some aspect of mobile security
  - Strive for new research/development contributions – aim for something never done before
  - Not be a project you're working on for your research or another course
- Examples of past projects (see my office door for F14):
  - Understanding OAuth implementation and design flaws
  - Enabling “Private Mode” for Android apps
  - Per-app passive authentication controls
  - User-controlled permission management w/ rate limiting
  - BYOD analysis framework and study of current products

How should I form a project team?

Project Teams

- Forming teams and choosing topics:
  - These two things are not independent
  - Try to choose team members with common interests, different backgrounds, etc., **not just your friends**
  - Multiple teams cannot work on the same project

More Project Details

- Each project will have a faculty advisor
  - Probably me, but you can approach any faculty member who may have a relevant project to “sponsor”
- Project output will include a paper, poster, and demo
  - Aim for conference-quality results
- Some additional hardware may be available, if needed

September 3:
Mobile Devices &
General Security Challenges

More discussion of
course deliverables