

## Teams

- New teams are assigned on Blackboard
- New teams labeled A-T, with no "I" or "O"...
- ...and no "G" because I forgot it
- 9 AM Friday
  - A,B,J,L,P,Q,S,T
- 10 AM Friday
  - C,D,E,F,H,K,M,N,R

## CMPE349 Intro to Professional Practice Overall AHPLS System Design

## What are our options?

- **Instrument Landing System (1940s)**
  - Single (straight in) approach on single (nominally 3 degree glide path)
  - Significant site preparation
  - Cheap avionics
  - CAT I/II/III all available
  - 100 MHz / 300 MHz
- **Microwave Landing System (1970-1990)**
  - Support for curved and segmented approaches
  - +/- 60 Azimuth, 2-30 Elevation, 0-22 nmi coverage
  - Data functions available
  - CAT III accuracy at all runways (but not CAT III ops)
  - C-Band (5000 MHz) + L-Band (1000 MHz)
  - New receiver in aircraft

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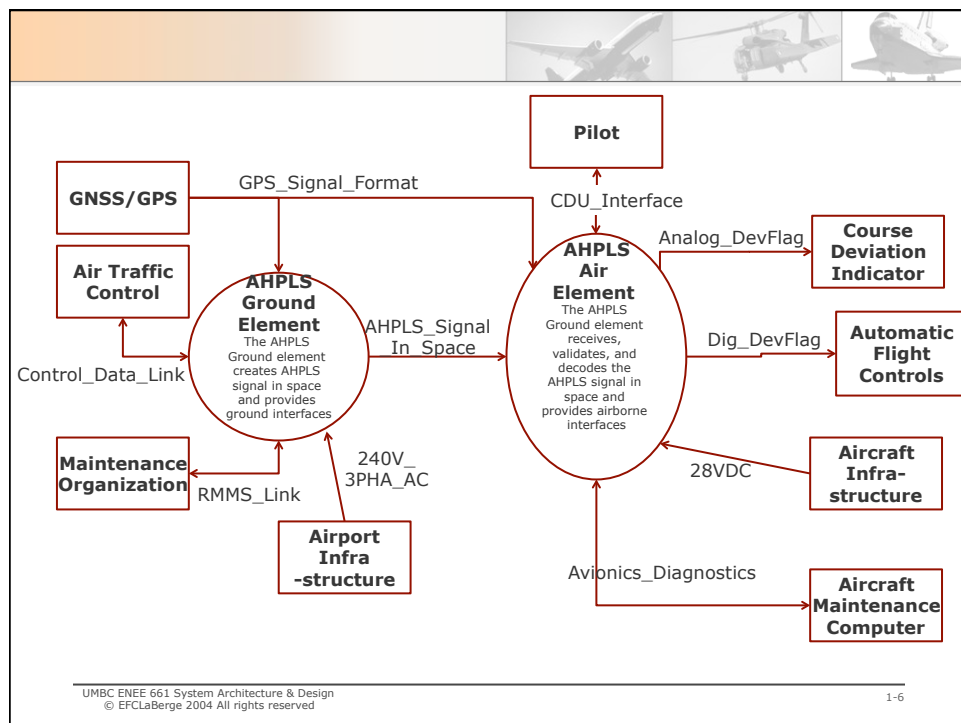
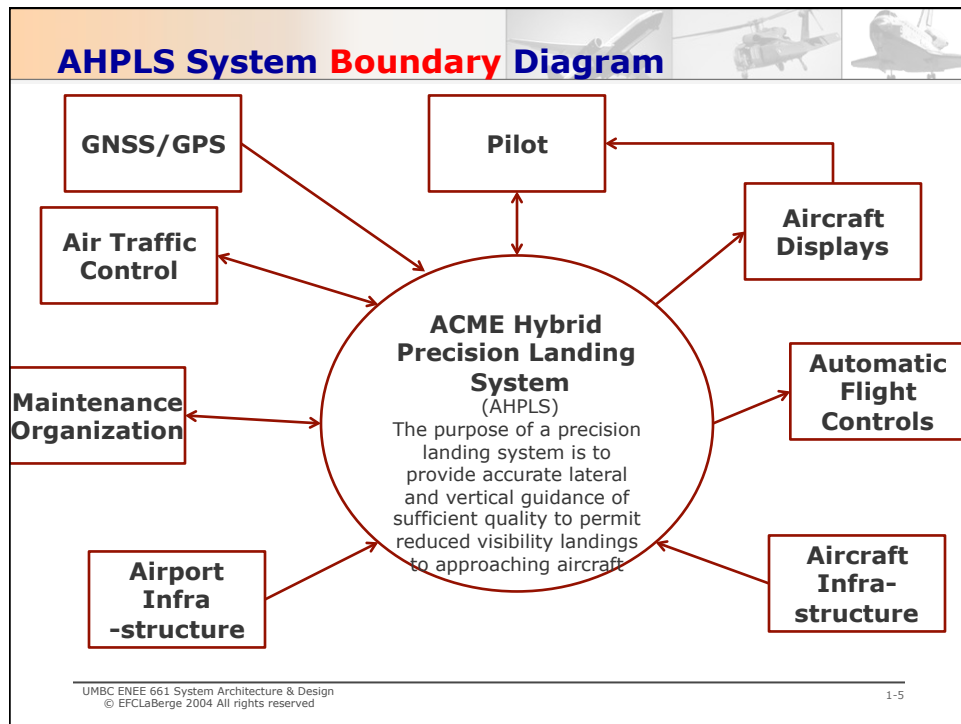
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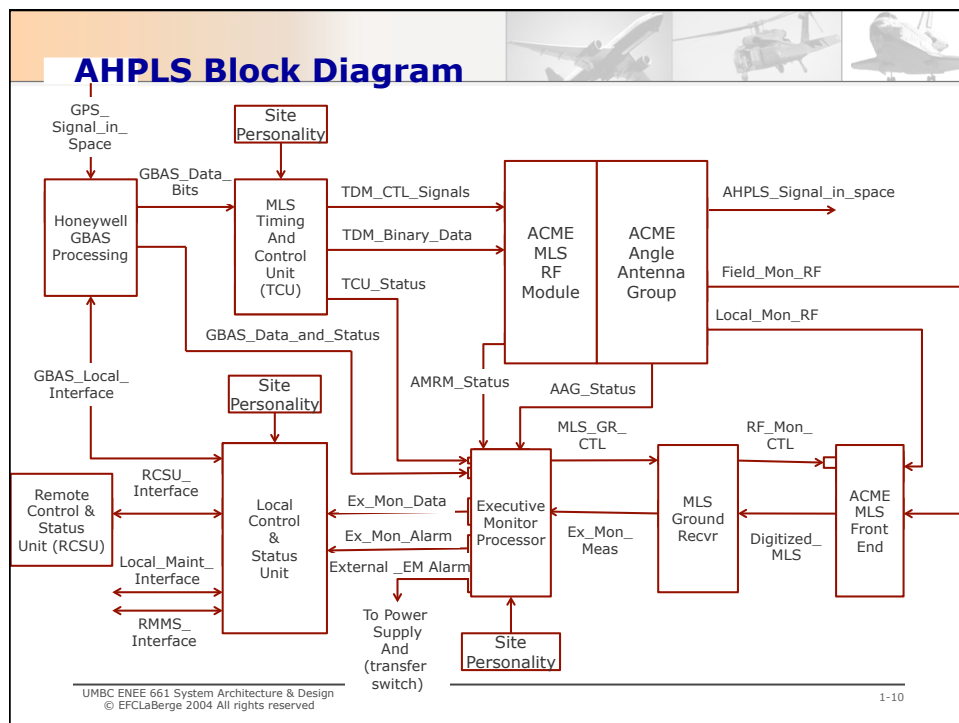
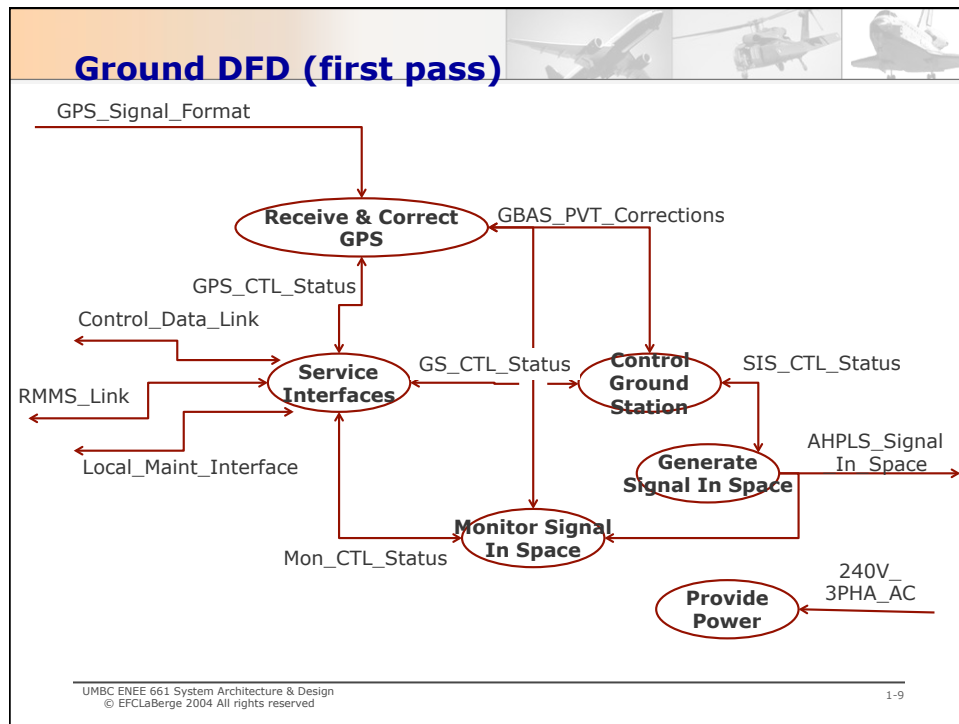
## ...more

- **GPS with Ground Based Augmentation System(GBAS)**
  - Differential GPS
  - CAT I, maybe CAT II
  - Minimal ground site prep
  - VHF Data Broadcast well defined
  - VDB receiver or VDB modification to existing
- **ACME Hybrid Precision Landing System**
  - MLS Elevation Function at C-Band for z coordinate
  - Expanded MLS Data to carry VHF Data Broadcast Info
  - GBAS GPS for azimuth (x-y) and range
  - New receiver, lots of real-time math
  - LAAS GPS ground station available COTS

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1-4





## Master Specifications are very good

- **FAA-E-2721/xx Equipment Specifications**
- **FAA-STD-022 Signal in Space Definition**
- **(ICAO) Annex 10 GBAS**
- **Some additional work on C-Band, airport surface communications Aero Max**
  
- **But there aren't any specifications for AHPLS, *per se***
- **That's where you come in!**

		Primary Spec Paragraphs
Executive Monitor Processor	ExMon	2721/12 2-3.5; plus GBAS per separate document;
MLS Ground Receiver	MGR	2721/12 2-3.6; RTCA-DO-177 selected paragraphs;
Remote Control & Status Unit	RCSU	2721/11 3.5.1, same design doubles as 3.5.2 w/o control inputs;
Local Control and Status Unit	LCSU	Includes RMMS interface via AeroMax (spec to come); 2721/11 3.5.3.6.2 - 3.5.3.11 except with AeroMax;
MLS Timing and Control Unit	TCU	FAA-STD-022b: All references to Elevation function except those dealing with RF power; 3.5.2(2); no BD1, BD2, no BD3, no BD4, no BD5, BD6, Aux A1, Aux A2, no A3, no A4, Appx II for Elevation, Basic Data, Aux Data; define new Aux DataG per separate document

## How does GPS Work?

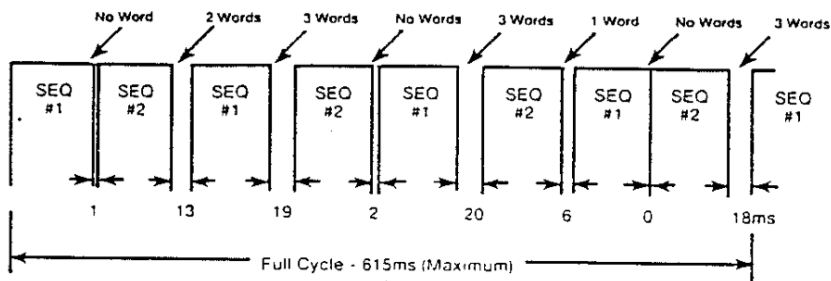


## And why does it need local correction?



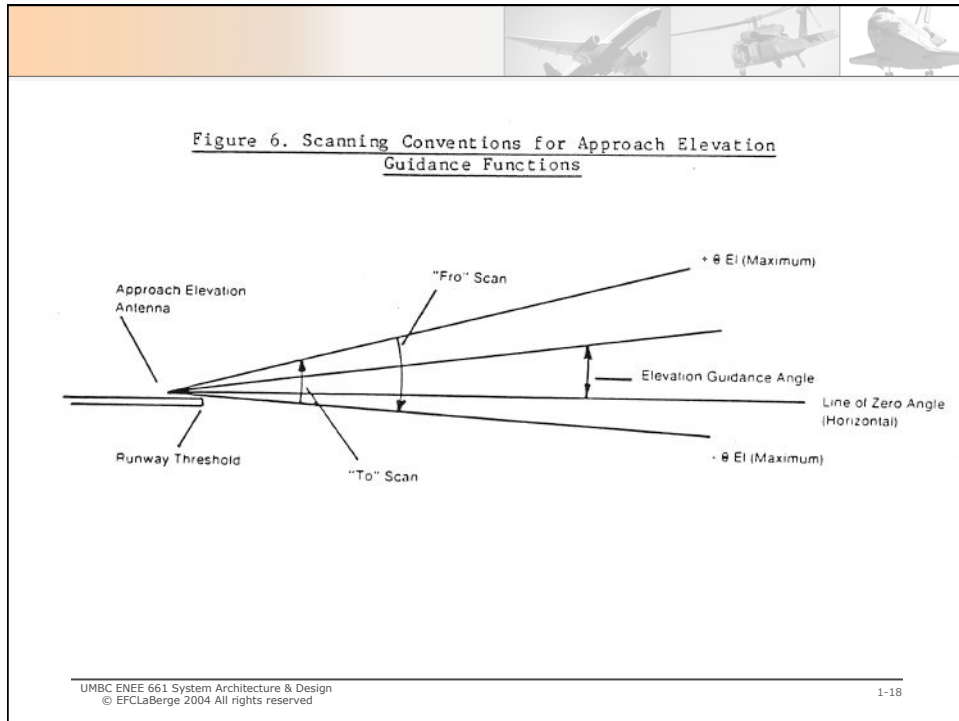
# The original MLS Signal Format

Figure 9. Complete Multiplex Transmission Cycle



Sequence #1	Time (ms)	Sequence #2
Approach Elevation	0	Approach Elevation
	10	Flare
Approach Azimuth	20	Approach Azimuth
Flare	30	Flare
Approach Elevation		Approach Elevation
Back Azimuth	50	Growth (18.2ms Max) (Note 2)
(Note 2)		
Approach Elevation	60	Approach Elevation
Flare	66.7	Flare

(Note 3)



## (Y)Our Tasks

- Saw the MLS specifications apart ...
- ... And reconstruct just what we need
- Design the various elements



## Prep for Friday



- Be up to date on your assignments in Rothwell & Cloud
- Read through Redlein & Kelly paper on MLS, emphasizing the following sections
  - I.A, I.B, I.C, I.H
  - II.A, II.B
  - III.A, III.B
  - As you are reading, concentrate on the Elevation Function and the Basic Data and Auxiliary Data functions
  - You can skim the other functions for completeness, but we will focus on EL, BDW, and ADW
- Friday we will meet at 9 and 10 in ENGR231
  - 9 AM Friday: Teams A,B,J,L,P,Q,S,T
  - 10 AM Friday: Teams C,D,E,F,H,K,M,N,R

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1-20