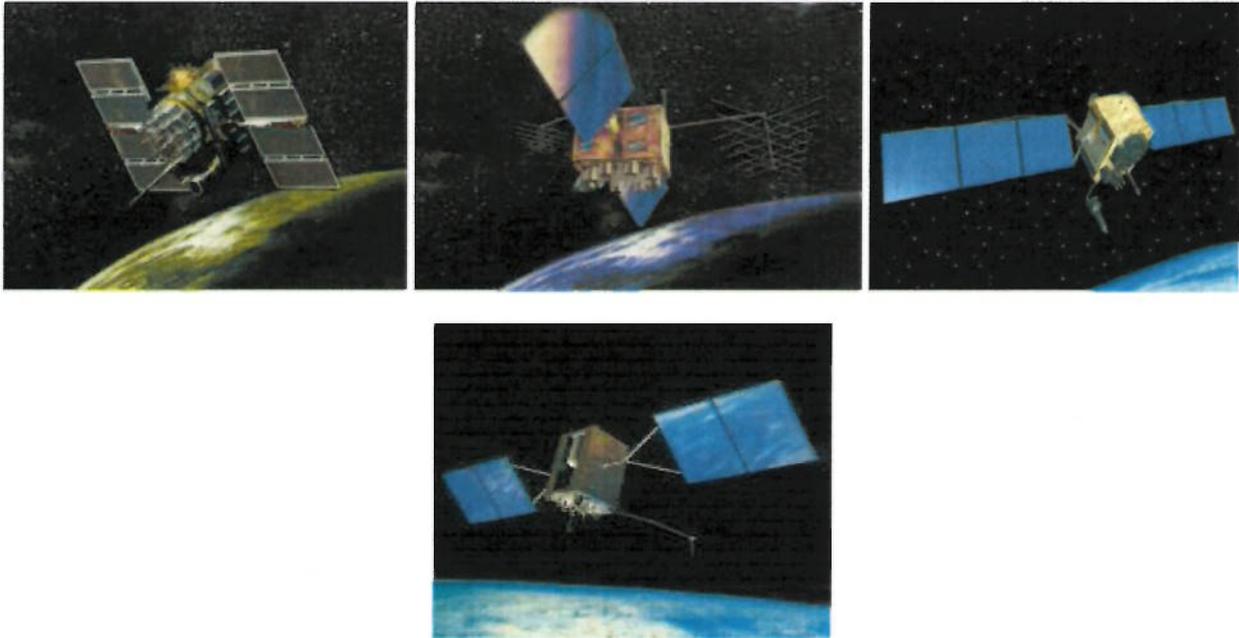
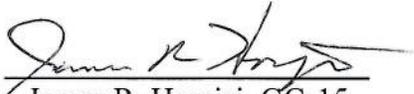


GLOBAL POSITIONING SYSTEMS DIRECTORATE (SMC/GP)  
PSEUDORANDOM NOISE (PRN) CODE  
ASSIGNMENT PROCESS

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## Executive Summary

The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis—freely available to all. The United States Air Force (USAF) is the executive agent of GPS and is directly responsible for acquiring, operating, and sustaining survivable, effective, and affordable global positioning services for its worldwide customers. The USAF's GPS Directorate (SMC/GP) is managed at the Space and Missile Systems Center (SMC), Air Force Space Command (AFSPC), and is responsible for developing, procuring, and sustaining GPS satellites, ground systems, and military user equipment.

With the advent of domestic and international GPS augmentation systems and other Global Navigation Satellite Systems (GNSS), managing the issuance and use of GPS pseudorandom noise (PRN) codes to prevent unnecessary mutual interference has become critical. As part of its acquisition and sustainment effort for GPS, SMC/GP is responsible for managing the issuance of GPS PRN codes. For this purpose, a large set of GPS PRN codes providing favorable auto-correlation and cross-correlation properties have been pre-selected, and SMC/GP will select and issue PRN codes from this set.

The SMC/GP PRN Code Assignment Process document describes the process for requesting, assigning, and recording the GPS PRN codes pre-selected and defined in GPS interface specifications IS-GPS-200, IS-GPS-705, and IS-GPS-800. A PRN code consists of distinct PRN codes for each of the GPS L1, L2, and L5 civil signals defined in the previously listed interface specifications. A formal request for a PRN code is initiated when a requesting agency submits the "Application for PRN Code Assignment" to SMC/GP. Upon satisfactory review results, SMC/GP will issue a PRN code assignment to the requesting agency. The assignment may be either Preliminary (expires in 3 years) or Final (expires in 10 years) and the applicant may renew the assigned PRN code prior to the expiration. The lists of assigned and available PRN codes along with the Application for PRN Code Assignment are found on the SMC/GP PRN Assignment Website at <http://www.losangeles.af.mil/library/factsheets/factsheet.asp?id=8618>.

## 1. Document Scope

- 1.1. The purpose of this document is to describe the process for requesting, assigning, and recording the GPS PRN codes defined in GPS interface specifications IS-GPS-200, IS-GPS-705, and IS-GPS-800.
- 1.2. The procedure established in this document applies to systems other than GPS (exempli gratia, a Space-Based Augmentation System (SBAS)) planning to transmit GPS augmentation signals using one or more of the following PRN codes: L1 Coarse/Acquisition (C/A)-code, L1 Civil-Pilot (L1C<sub>P</sub>), L1 Civil-Data (L1C<sub>D</sub>), L2 Civil-Moderate (L2 CM)-code, L2 Civil-Long (L2 CL)-code, L5 In-Phase (L5 I5)-code, and L5 Quadrature-Phase (L5 Q5)-code defined in IS-GPS-200, IS-GPS-705, and IS-GPS-800.
- 1.3. The objectives of the SMC/GP PRN Code Assignment Process are (1) to establish SMC/GP as the single focal point for L1, L2, and L5 PRN code assignments; (2) to prevent multiple assignments of the same PRN code; (3) to assign PRN codes with compatible characteristics; and (4) to assign PRN codes in a transparent manner.
- 1.4. NOTE: Although SMC/GP conducts an initial check on PRN code requests with respect to potential interference issues, the issuance of a PRN code assignment does not convey authority to radiate in the frequency band. SMC/GP will explicitly communicate this point in both discussions with the applicant and in the SMC/GP PRN code assignment memorandum.
- 1.5. In order to radiate in GPS L1, L2, and/or L5 bands, the applicant shall obtain a frequency assignment from the appropriate national authority and, if the applicant will radiate from a satellite(s), the applicant shall register with the International Telecommunication Union (ITU). The specific frequency assignment process, ITU operator-to-operator coordination process, and radiation approval process are beyond the scope of this document.

## 2. SMC/GP PRN Code Assignment Overview

- 2.1. Many domestic and international radionavigation systems seek a high level of interoperability with GPS, including the use of PRN codes from the spreading code families developed for GPS. Signals that employ PRN codes from the GPS spreading code families achieve an established level of code performance, including compatibility with GPS signals. Additionally, the use of PRN codes from the GPS spreading code families fosters the development of receivers capable of seamlessly using signals from more than one radionavigation system. The resulting compatibility and interoperability are beneficial to all systems using GPS PRN codes.
- 2.2. The GPS PRN spreading codes have been developed and are listed in IS-GPS-200, IS-GPS-705, and IS-GPS-800. Baseline sets of PRN codes are reserved exclusively for use by GPS satellites. Additional sets of PRN codes are defined for use by cooperating radio

navigation systems. The coordination process for PRN codes is simplified when predefined sets of PRN codes are used. The available predefined sets of PRN codes can be viewed at <http://www.losangeles.af.mil/library/factsheets/factsheet.asp?id=8618> by selecting the appropriate “PRN Code Assignments” link. Extensive evaluation is required if PRN codes other than the predefined PRN codes are considered.

2.3. SMC/GP does not support civil/commercial terrestrial transmissions in the GPS frequency bands due to the potential to degrade GPS performance.

2.4. Issuance of PRN codes to an administration is not an endorsement or approval of the system for use by the GPS Directorate or the United States Air Force. Administrations are responsible for the operation of their system in accordance with all applicable rules and regulations.

**Table 1. PRN Codes and Associated PRN Allocations**

<b>PRN Code</b>	<b>PRN Allocation</b>
<b>L1 C/A</b>	
1 - 63	Reserved (GPS)
64 - 119	Other Augmentation Systems
120 - 138	Space Based Augmentation System
139 - 158	Space Based Augmentation System Expansion/Testing
159 - 210	Other Global Navigation Satellite System & Other Applications
<b>L1C</b>	
1 - 63	Reserved (GPS)
64 - 119	Other Augmentation Systems
120 - 158	Space Based Augmentation System
159 - 210	Other Global Navigation Satellite System & Other Applications
<b>L2C</b>	
1 - 63	Reserved (GPS)
64 - 158	Unallocated
159 - 210	Other Global Navigation Satellite System & Other Applications
<b>L5</b>	
1 - 63	Reserved (GPS)
64 - 119	Unallocated
120 - 158	Space Based Augmentation System
159 - 210	Other Global Navigation Satellite System & Other Applications

### **3. Requesting an SMC/GP PRN Code Assignment**

- 3.1. To request one or more PRN code assignments, a requesting agency must provide the identification and system information by filling out the “Application for PRN Code Assignment” found on the SMC/GP PRN Assignment Website and included in Appendix A of this document. Once the application is complete, the requesting agency should email the application to SMC/GP at [smc.gp.prn@us.af.mil](mailto:smc.gp.prn@us.af.mil). During the PRN code assignment process, SMC/GP will review the submitted data and may request additional information. The assignment process generally will require three to six weeks following proper submission of all required information. If the review results are satisfactory, SMC/GP will issue a PRN code assignment (Preliminary or Final as discussed in Section 5) to the requesting agency. If there are concerns about mutual interference or other interactions, SMC/GP will contact the requesting agency to initiate more in-depth discussions.
- 3.2. If an applicant requests a specific PRN code, SMC/GP will issue that specific PRN code if available. If the PRN code assignment is approved, SMC/GP will publish appropriate updates to the L1 C/A, L1C, L2C, and/or L5 PRN Code Assignment Tables to the SMC/GP PRN Website at <http://www.losangeles.af.mil/library/factsheets/factsheet.asp?id=8618>.

### **4. Filing with Appropriate Spectrum Regulatory Authority**

- 4.1. The applicant and/or applicant’s sponsoring administration is responsible for filing with the appropriate spectrum regulatory agencies for its radio frequency transmissions. These may include the ITU, the appropriate domestic spectrum regulatory agency, and other authorities as required. Assignments will not be processed until proper documentation including but not limited to proof of proper filings with both international and domestic regulatory bodies has been provided.

### **5. Obtaining and Renewing SMC/GP PRN Code Assignments**

- 5.1. As indicated in Section 3, SMC/GP may approve and issue specific PRN code assignments upon successful completion of the PRN code assignment process, including any necessary frequency coordination between SMC/GP and the requesting agency. PRN code assignments are either preliminary (expires in three years) or final (expires in 10 years). Issued PRN code assignments will be identified as final if the SMC/GP review verifies the requestor has received a published ITU Notification filing for the satellite system or other appropriate regulatory agency publication for the system that will utilize the PRN code(s). These documents should be provided to SMC/GP at the time of request via [smc.gp.prn@us.af.mil](mailto:smc.gp.prn@us.af.mil). Otherwise, only a preliminary assignment is granted. Applicants must renew preliminary PRN code assignments three years after issuance, whereas applicants must renew final PRN code assignments 10 years after issuance. The renewal process provides an opportunity to determine if PRN codes are still in use and to recover them for reissue if they are no longer in use.

- 5.2. A year prior to the expiration of a PRN code assignment, applicants desiring to renew their PRN code assignments should contact SMC/GP to initiate the renewal process. Renewal of a PRN code assignment requires resubmission of the application information to SMC/GP with updates to any information that changed since the previous application.
- 5.3. In addition to the above, SMC/GP may issue PRN code assignments on a temporary basis for a 6-month or 1-year period for special testing purposes. If the PRN code request is only for testing, the requesting agency must provide the additional information detailed in Appendix A.
- 5.4. Whenever any information filed with SMC/GP has changed, the requesting agency should provide the updated information to SMC/GP as soon as possible.
- 5.5. SMC/GP reserves the right to revoke or suspend any active PRN code assignment if the system is found to not be in compliance with international and/or domestic regulations and filings

## **6. Contacting SMC/GP**

- 6.1. The GPS Systems Engineering and Integration Division (SMC/GPE) is the process owner of the PRN code assignment process. Applicants may contact SMC/GP with any comments and/or questions via email at [smc.gp.prn@us.af.mil](mailto:smc.gp.prn@us.af.mil).

## **Appendix A: Application for PRN Code Assignment**

To initiate the PRN code assignment process, an applicant must provide the identification and system information by (1) filling out the “Application for PRN Code Assignment” located on the SMC/GP PRN Website and (2) emailing the completed application to SMC/GP at [smc.gp.prn@us.af.mil](mailto:smc.gp.prn@us.af.mil). NOTE: The application located on the SMC/GP PRN Website may be completed and submitted electronically. A copy of the application is included in this appendix, but it is not interactive and does not support electronic completion.

**APPLICATION FOR PRN  
CODE ASSIGNMENT**

DATE

Page 1 of 3

Submit by Email

TO SMC/GP  
483 North Aviation Blvd.  
El Segundo, CA 90245-4659  
USA  
Fax +1-310-653-3676  
Email smc.gp.prn@us.af.mil



**APPLICANT'S INFORMATION**

1. FIRST NAME <input type="text"/>	2. FAMILYNAME <input type="text"/>	3. MIDDLE NAME <input type="text"/>
4. TITLE <input type="text"/>		5. ORGANIZATION <input type="text"/>
6. ADDRESS 1 CITY STATE ZIP CODE COUNTRY <input type="text"/>	7. ADDRESS 2 CITY STATE ZIP CODE COUNTRY <input type="text"/>	
8. TELEPHONE <input type="text"/>	9. FAX <input type="text"/>	10. E-MAIL <input type="text"/>

**SYSTEM INFORMATION**

11. SYSTEM NAME (if any) <input type="text"/>		12. SPONSORING GOVERNMENT <input type="text"/>	
13. ORGANIZATION/DEPARTMENT <input type="text"/>		14. DATE OR ANTICIPATED DATE OF ITU (or other regulatory agency) FILING <input type="text"/>	
15a. QUANTITY OF PRNs REQUESTED <input type="text"/>	15b. PRN CODE(S) IF YOU HAVE PREFERENCE; OTHERWISE INDICATE 'NONE' <input type="text"/>		
16. SATELLITE ORBIT PARAMETERS			
16a. LONGITUDE, long (degrees) *GEO only* <input type="text"/>	16b. SEMI-MAJOR AXIS, SMA (meters) <input type="text"/>		
16c. ECCENTRICITY, e <input type="text"/>	16d. INCLINATION, i (degrees) <input type="text"/>		
16e. RAAN (degrees) FOR EACH SATELLITE <input type="text"/>	16f. ARGUMENT OF PERIGEE (degrees) <input type="text"/>		
16g. MEAN ANOMALY (degrees) FOR EACH SATELLITE <input type="text"/>	16h. UTC TIME OF EPOCH (MMDDYY HH:MM:SS) <input type="text"/>		
17. MAXIMUM RECEIVED ISOTROPIC POWER (dBW) ON SURFACE OF EARTH			
17a. L1 C/A <input type="text"/>	17b. L1C <sub>p</sub> <input type="text"/>	17c. L1C <sub>D</sub> <input type="text"/>	
17d. L2 CL <input type="text"/>	17e. L2 CM <input type="text"/>	17f. L5 I5 <input type="text"/>	
17g. L5 Q5 <input type="text"/>			

**APPLICATION FOR PRN CODE ASSIGNMENT (continued)**

18. RECEIVED ISOTROPIC POWER (RIP) ON SURFACE OF EARTH AS A FUNCTION OF ELEVATION ANGLE

18a. L1 C/A

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

18b. L1C<sub>p</sub>

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

18c. L1C<sub>D</sub>

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

18d. L2 CL

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

18e. L2 CM

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

18f. L5 I5

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

18g. L5 Q5

Elev Angle (degrees)	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
RIP(dBW)																					

19. REMARKS

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**APPLICATION FOR PRN CCODE ASSIGNMENT (continued)**

20. PRN CODE REQUEST FOR TESTING PURPOSES ONLY (use additional pages if necessary)

In special cases, PRN assignments are made on a temporary basis for a 6-month or 1-year period for testing purpose only. If the PRN request is only for testing purpose the following additional information should be provided before the PRN assignment is made.

20a. PROPOSAL/TEST DESCRIPTION

Please provide a short test description clarifying details of your operations and what you hope to accomplish from the test.

20b. POWER LEVELS AND MODE OF OPERATIONS

Effective Isotropic Radiated Power (e.i.r.p.), dBW.

20c. TRANSMIT ANTENNA GAIN PATTERN

20d. PULSED MODE

pulse duty cycle

pulse repetition rate

20e. INTERFERENCE ANALYSIS

Describe measures taken to avoid interference and details of interference analysis done.

21. COMMENTS/SPECIAL REQUESTS