

Questionnaire on Current and Planned Use of L-Band and X-Band
Direct Readout Services from the Joint Polar-Orbiting Satellite
Systems (JPSS)

Dear Sir/Madam,

NOAA is in the process of re-evaluating the need for direct readout services on its future polar-orbiting satellite system. Due to budget considerations the direct services are being analyzed to determine if there is a user requirement. Several NOAA managers believe data delivery can be met via other dissemination means (land-lines, commercial rebroadcast, Internet, etc.). This inquiry is intended to seek your opinion on the future of direct readout services.

The Joint Polar Satellite System (JPSS) plans to carry the High Rate Data (HRD) on its spacecraft constellation. The HRD broadcast is a complete, full resolution data set containing sensor data from the entire instrument suite. A complete set of auxiliary/ancillary data will be available at an on-line server for field terminal real-time processing. The HRD broadcast will be transmitted at X-band frequencies in the 7750-7850 MHz band (carrier frequencies of 7812 MHz and 7830 MHz), at a data rate of 20 Mbps, and will require a bandwidth of 30.8 MHz, with a tracking receive antenna aperture not to exceed 2.0 meters in diameter. The HRD continuity is expected from S-NPP through JPSS.

Starting with the operation of JPSS-2, the NOAA JPSS Program Office (JPO) will simultaneously broadcast two continuous real-time data streams, at high and low rates, to suitably equipped field terminals worldwide. These direct broadcast/real-time ground stations (or field terminals) will be capable of processing RDRs into EDRs by utilizing the FTS processing software appropriate for the type of field terminal.

The Low Rate Data (LRD) broadcast will be a subset of the full sensor data set and is intended for U.S. and worldwide users of field terminals (land and ship-based, fixed and mobile

environmental data receivers operated by DoD users and surface receivers operated by other U.S. government agencies, worldwide weather services, and other international users). The LRD is an L-band broadcast that will provide data at a rate of about 4.0 Mbps (nominally 3.88 Mbps) at 1706 MHz, using a bandwidth of 8 MHz, with full Consultative Committee for Space Data Systems (CCSDS) convolutional coding, Viterbi decoding, and Reed Solomon encoding/decoding into a tracking receive antenna aperture not to exceed 1.0 meter diameter.

The LRD parameters (frequency, bandwidth, data rate, and data content) have been selected to satisfy U.S. requirements for low-rate, real-time direct broadcast, as well as be closely compatible with (but not identical to) the broadcast parameters for the Advanced High Resolution Picture Transmission (AHRPT) format that has been accepted and approved by the Coordinating Group on Meteorological Satellites (CGMS) and will be used on the EUMETSAT MetOp spacecraft.

The LRD broadcast will include data required to satisfy the U.S. user-specified, eight highest priority EDRs for real-time broadcast: imagery (from VIIRS) at 800 m HSI from at least one visible and one infrared channel and night time imagery at 2.7 km HSI from the day/night band; atmospheric vertical temperature and moisture profiles (from CrIS, and ATMS); global sea surface winds; cloud base height, cloud cover/layers; pressure (surface/profile), and sea surface temperature. Additional lower priority EDRs will also be included in the LRD broadcast on a priority basis and as bandwidth permits.

Future communications capabilities (e.g., rebroadcast of processed imagery/data and delivery via the Internet or “commercial” services) may allow other-than-direct satellite-to-ground data transmission to follow-on (future) field terminal systems.

The purpose of this letter is get your opinion on the evolution of direct readout systems that will affect future generations of polar orbiting satellites, and to seek your feedback

on the use or planned use of such direct readout systems.

Additionally, the NOAA JPSS Program Office (JPO) believes that the data included in an LRD broadcast can be provided to users through other means. Several satellite operators are now considering using the X-Band (around 8 GHz) for direct readout from future generations of polar-orbiting systems. The main reason is that advances in remote-sensing technology result in high-resolution instruments that will generate one order of magnitude more data than a decade ago, and such high data rates cannot be accommodated in lower frequency transmissions. Furthermore, progress in radio-communication techniques renders X-Band receiving equipment more “affordable” than it used to be. Within the X-Band, the 7750-7900 MHz band, has been given, by the ITU, a primary allocation to space-to-Earth data transmission from polar-orbiting meteorological satellites.

For users, the consequence of direct readout services being available in X-Band, in comparison to the L-Band, can be summarized as follows:

- Access to higher data rate services (20 Mb/s instead of 3.8 Mb/s), which is necessary for full data access at full resolution;
- Need to use a higher-class antenna and receiving chain (system cost: X-band \$350K-400K, L-band \$150-200K);
- Higher sensitivity to rain, requiring appropriate margins in the link budget, especially for inter-tropical latitudes;
- Higher risk of interfering sources: the X-Band is used by many other telecommunication applications, and the feasibility to operate an X-Band receiving site without interference has to be checked on a case by case basis for each site. To avoid interference issues, it is essential to immediately register the receiving site and frequency with the national radio-frequency regulator for the intended operation.

The combination of these two services is expected to satisfy the user needs for efficiency, robustness and affordability. However, maintaining two different services in parallel is a design constraint for future satellite systems. Further, can an alternate system replace one or both of these systems?

Therefore, in order to re-assess the requirements for a HRD and LRD service, you are invited to provide your feedback or requirements for the system that best meets you needs. For this purpose, a short questionnaire has been prepared. The questionnaire can be found at:

<https://docs.google.com/a/noaa.gov/forms/d/1CchrRgDda7fsJCMXeVbmdPEtyP8WTTTOApg7N9g9BPIs/edit>. Please complete the form and click "SEND FORM". Your responses will be automatically recorded.

Your response to this important satellite data dissemination issue will be greatly appreciated. Please provide your response no later than **20 September 2013**. If you have any question or concerns, please contact Marlin.O.Perkins@noaa.gov for further clarification. Your cooperation is deeply respected. Thanks for your time and patience.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other suggestions for reducing this burden to Marlin.O.Perkins@noaa.gov.

All respondents are advised that any information you submit will be treated in accordance with the U.S. Freedom of Information Act.

NOAA does not disclose any of your personal information that would constitute an invasion of your personal privacy.

NOAA provides a limited amount of information about the type of station you operate and satellite data you receive to the WMO.

NOAA does not provide personal information about you to the WMO.

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Thank you for taking the time to complete this survey.