# Title Update on Multicast for the GISC communications

## Table of contents

## Background on Multicast

1. Because Multicast has the potential to allow simultaneous transmission to multiple destinations using a single data stream, it has the potential to reduce bandwidth on the GTS and reduce time spent by sources delivering messages. Given the large number of GISCs this could reduce overheads in delivery of the same data to multiple destinations, by allowing them to subscribe to data streams as they need. Multicast data transfer is used extensively in Satellite systems because of their broadcast nature – an "any to any" network like the RMDCN or internet can take advantage of the same technologies. Multicast routing and joining protocols are well defined and could be easily used by agency routers connected to network links. The RMDCN is multicast capable and could be used for this purpose.

## Issues

1. Availability of a multicast-enabled network
	1. Multicast is an option for the RMDCN and can be used for message delivery between centers connected to it. The use of Multicast on the RMDCN is the primary focus.
	2. Multicast is not generally available on the Interment and so is not a viable option at the moment for Internet message delivery.
	3. Multicast may be available on other links either now or in the future
2. An overlay file transfer mechanism is needed to manage message delivery, error correction, and retransmissions. Two file transfer applications have been looked and will be discussed later:
	* 1. UFTP
		2. Tellicast as used by EUMETSAT
3. Slow links and multicast streams and packet loss
	1. Because Multicast is not connection orientated, flows from High speed to low speed links need specific configurations, example:
		1. Slow links should not oversubscribe to multicast flows
		2. The multicast network must have adequate buffering to support high speed to low speed data flows
		3. File transfer mechanism must handle packet loss but may introduce delay in transmissions e.g. timeouts and throttling of transmission speeds to lowest receiver speed.
4. Limited Experience with Multicast in this use
	* 1. Agencies will require a training to build up expertise
5. Unknowns regards how Multicast can be setup to support the current and future data flows particularly between GISCs
	1. Note unknowns regards flow requirements for GISC caching and data synchronization.

## Current Options for File Transfer mechanism

1. UFTP development
	1. UFTP is Open source and free but requires development to optimize throughput which can slow due to retransmission requests, and potential server utilization issues.
2. Tellicast as used by EUMETSAT
	1. This is a commercial product so would require agencies to purchase
	2. It has shown promising results and is used operationally
	3. It addresses a number of issues such as bandwidth management and subscription, and includes forward error correction and retransmissions
	4. How to fund the test – can software be provided free for testing?

## Multicast Addressing

1. We have the option of using either private IPV4 multicast addresses or registering public routable addresses
	1. Private addresses (The 239.0.0.0/8 range) could be used for private networks such as the GTS. The WMO has previously used private network allocations (such as AS Number allocations)
		1. A list of allocation should be made early so that Agencies can sort out conflicts with any current use of private multicast adspeddresses.
	2. Registered addresses could be used by agencies on a unilateral basis if an agency decides to do this.
	3. A register of multicast addresses and port numbers with products delivered will need to be kept
	4. Selection of the number of IP addresses and port number use will also depend on the capabilities file transfer software used.

## Current options for Implementation Plan

1. Make a decision on moving forward with Multicast dependent on outcome of current discussions on GISC network and Application flows
2. Make investigations of how final data flow arrangements could be done with multicast
3. Select and test File transfer mechanism on RMDCN
	1. Review EUMETSAT testing and search for other multicast transfer applications, for a decision on possible File transfer mechanisms
	2. Determine cost of Tellicast solution any other solutions
	3. Set up source and destination test servers and conduct tests including low speed links.
4. Get sign off of solution for multicast
5. Enable Multicast on RMDCN
	1. Selection of Multicast routing protocol options, multicast addressing, and other multicast options, including decision on traffic prioritization for Multicast
	2. Carrier provision of Multicast services
	3. Set up agency routers and network to connect to multicast network and use flows
6. WIS server Implementation
	1. Based on test results, Integration of File transfer mechanism into WIS for testing
	2. Use test to develop procedures for use of Multicast delivery with WIS, update Multicast setups as required and retest for final implementation.
	3. Update procedures and offer as option for message delivery between GISCs where links can support it.
7. Look at options for multicast delivery from GISCs WIS national centers

## Current state of Multicast Project

1. Documentation on investigations of both UFTP and Tellicast as used by EUMETSAT have been reviewed. No other software has been proposed as yet for Multicast data distribution. No decision on Tellicast as used by EUMETSAT or UFTP has been made.

## Proposals for consideration

1. Put on hold multicast development until structure of future interchange of data between GISCs is finalized.
2. Once GISC data interchange finalized, begin assessment of viability followed by design proposals as required, including
	1. Selection of Multicast routing protocol options, multicast addressing, and other multicast options for RMDCN. In particular begin work on a decision on use of private or registered IPV4 multicast addresses.
	2. Begin examination of File transfer applications including costs of using Tellicast software and determine affordability as compared to an Open Source UFTP implementation and any other systems that can be sourced
3. Develop detailed implementation plan on the basis of these investigations.

## References

[1] [Doc 3.1.2](http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-download_wiki_attachment.php?attId=1243) Multicast at EUMETSAT

[2] [Doc 3.1.3](http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-download_wiki_attachment.php?attId=1133) Consideration for a Multicast FTP solution

[3] [Doc 3.1.4](http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-download_wiki_attachment.php?attId=1155) Multicast based file transfers - Australia

## Recommended Text

Not Applicable

--------------------