The feasibility study on higher frequency band for EPoC FDD downstream

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Background and objective

- ✓ In the last Geneva meeting, the following motion was passed.

  For an FDD system, the EPoC standard shall support operation over the following frequency ranges:

  Downstream: 54 MHz to at least 1212 MHz
  Upstream: 10 MHz to at least 234 MHz

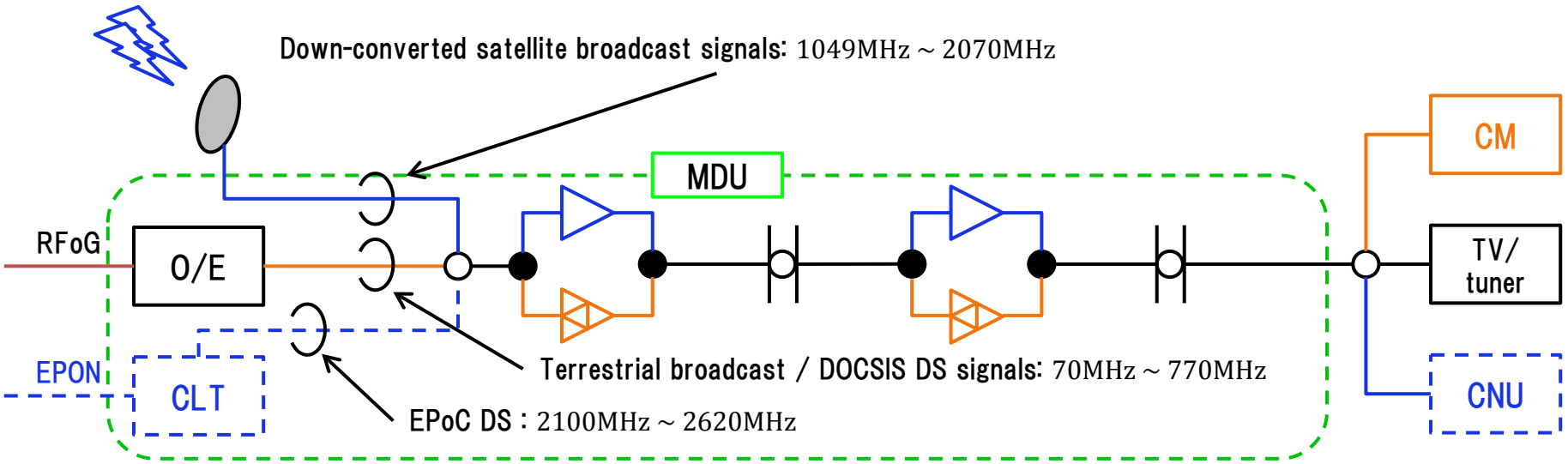
  Actual frequencies in use on the coax will depend on the diplexer, region, etc. Downstream operation above 1212 MHz to 2610 MHz is for further study.

- ✓ The objective of this presentation is to show the analytical and experimental results of the feasibility study on higher frequency band.

Typical use case of higher frequency band

- ✓ EPoC is considered to be mainly used in MDUs as FTTB + EPoC systems.
- ✓ A MDU network model in Japan is illustrated in adhoc_eval_uematsu_01_0513.pdf.
- ✓ A 2.1GHz ~ 2.6GHz frequency band in coax-based networks is reserved for the future extension of satellite broadcasting. No specific usage plan of this band has been announced.

Reference MDU network model (N+2)



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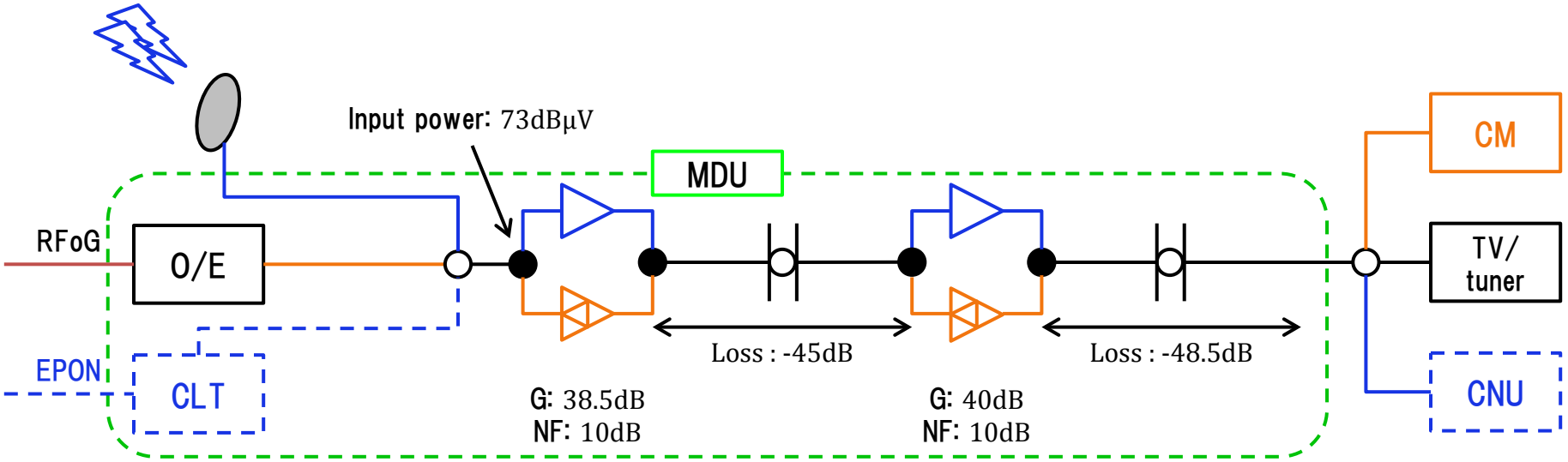
Expected CNR at higher frequency band

The estimated CNR at a 2.6 GHz frequency band is shown in the following table, and it found to be 37 dB with a 192 MHz bandwidth. As required CNR for 4096 QAM is about 35 dB (*2), a 2.6 GHz band is considered to be applicable for EPoC.

Bandwidth (MHz)	Rx CNR(*1) @ 2.6 GHz (dB)		
	No external noise	Tx CNR = 50dB	Tx CNR = 45dB
28.9 (satellite broadcasting)	46.2	44.7	42.6
6	53.0	48.3	44.3
12	50.0	47.0	43.8
96	41.0	40.5	39.6
192	38.0	37.7	37.2

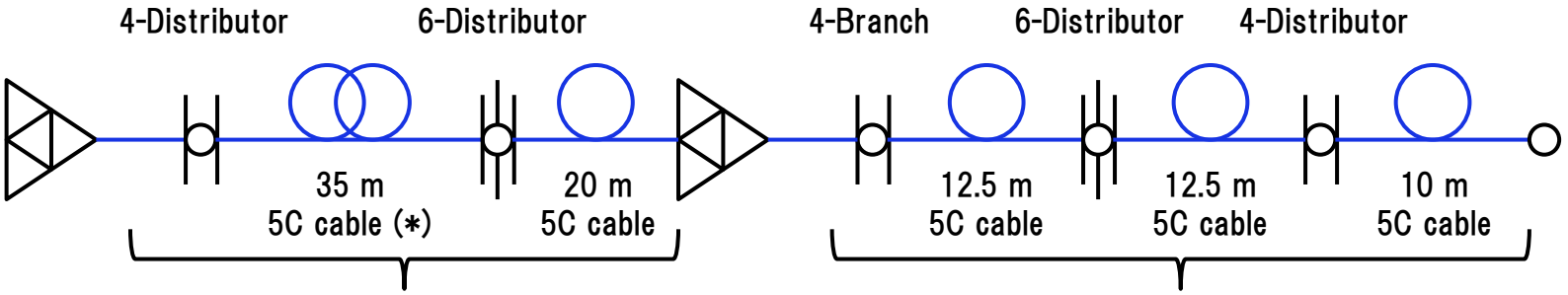
(*1) CNR is calculated based on thermal noise. (Not including the distortion due to reflection, interference, etc.)

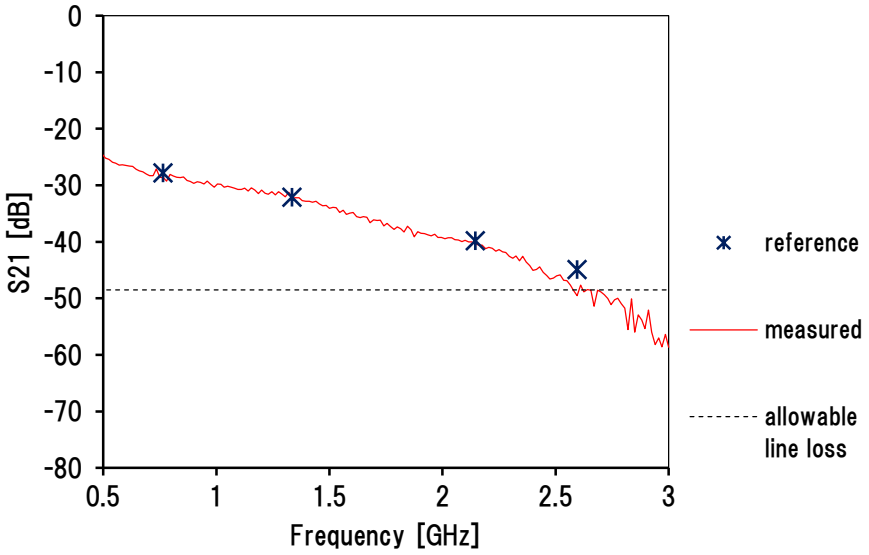
(*2) Ref.: dai 01b 1012.pdf , etc.

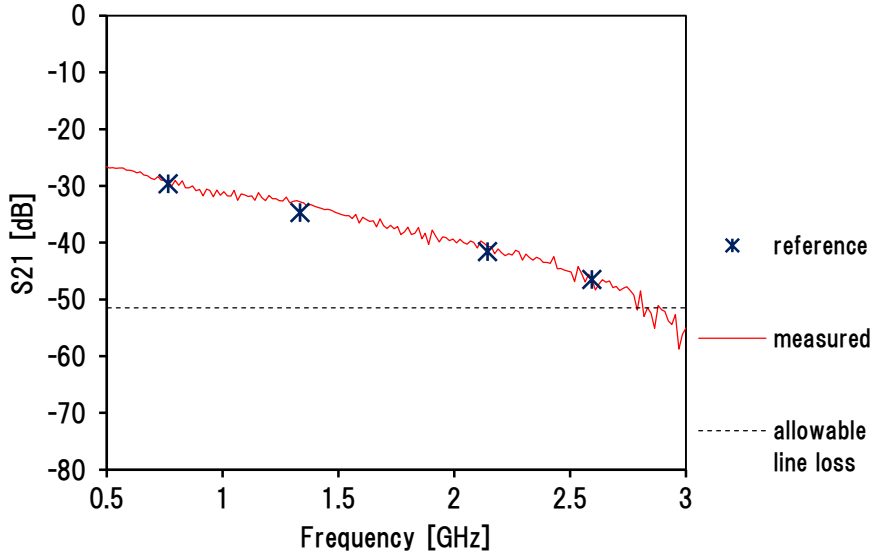


Experimental results

Measurement setup







✓ Almost same characteristics as that of the MDU network model is obtained.

(*) 5C cable corresponds to RG6 cable.

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Summary and future works

Summary of this presentation

- ✓ By using a MDU network model, we analytically estimated the expected CNR at a 2.6 GHz frequency band.
- ✓ Through these studies, it was found that the frequency band up to 2.6 GHz would be applicable for EPoC FDD downstream.

Future works

- ✓ More detailed measurement of channel characteristics
- ✓ Evaluation of the interference between existing signals
- ✓ Further study on channel model at higher frequency band