

Preliminary Study: Modeled 40G Reach on Category Cabling

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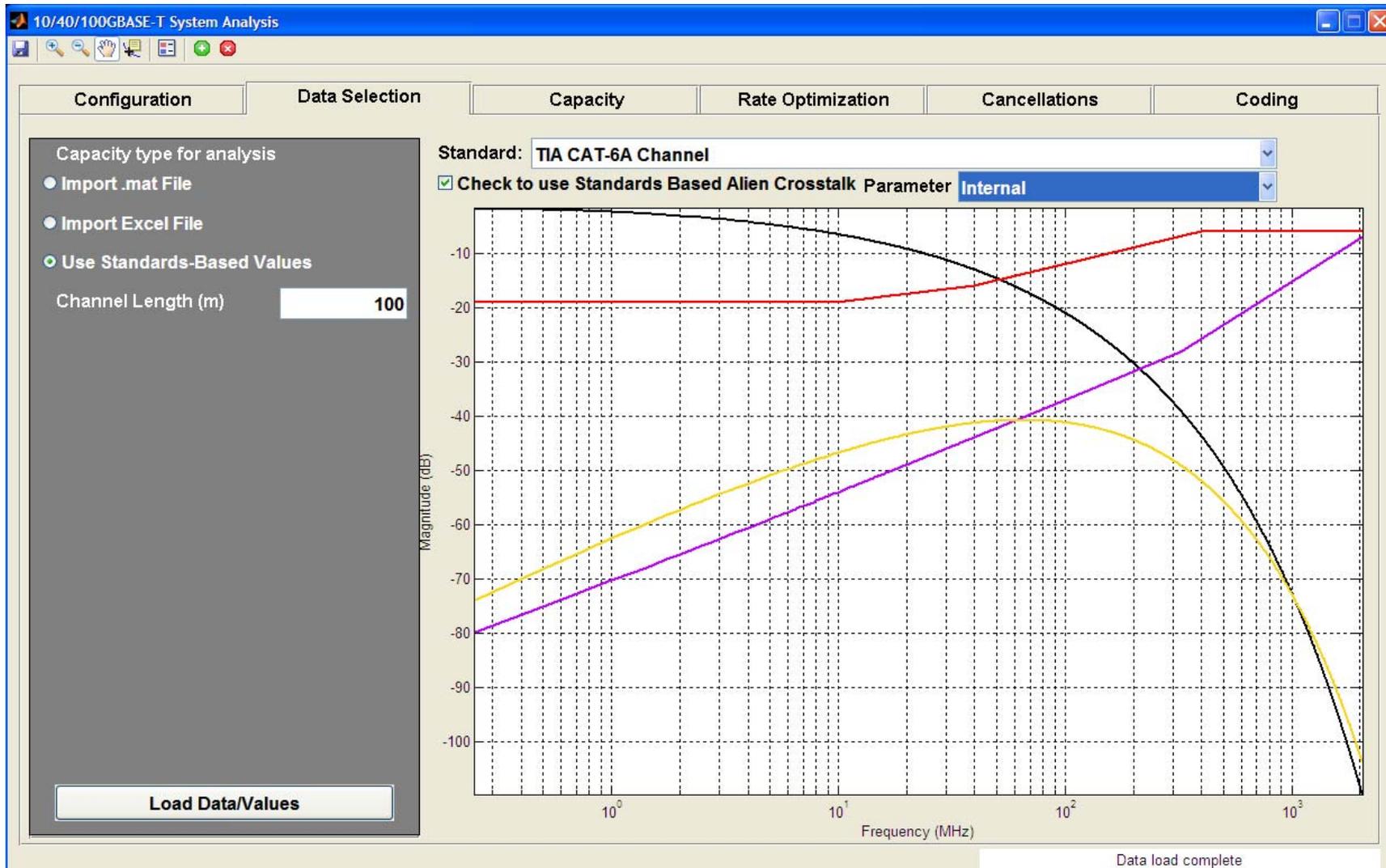
- Support the efforts for multiple implementations of next generation twisted pair (NGTP) technology
- Study reach capabilities of:
 - ◆ Standards based Channels:
 - Cat 6a U/UTP, F/UTP
 - Cat 7a F/FTP
 - ◆ Built Channels (2 Connector, Approximating predicted reaches)
 - Cat 6a U/UTP, F/UTP
 - Cat 7a F/FTP

Initial results indicate feasibility, with separate designs providing distinct reaches. However, extrapolated specifications not necessarily accurate to predict reach.

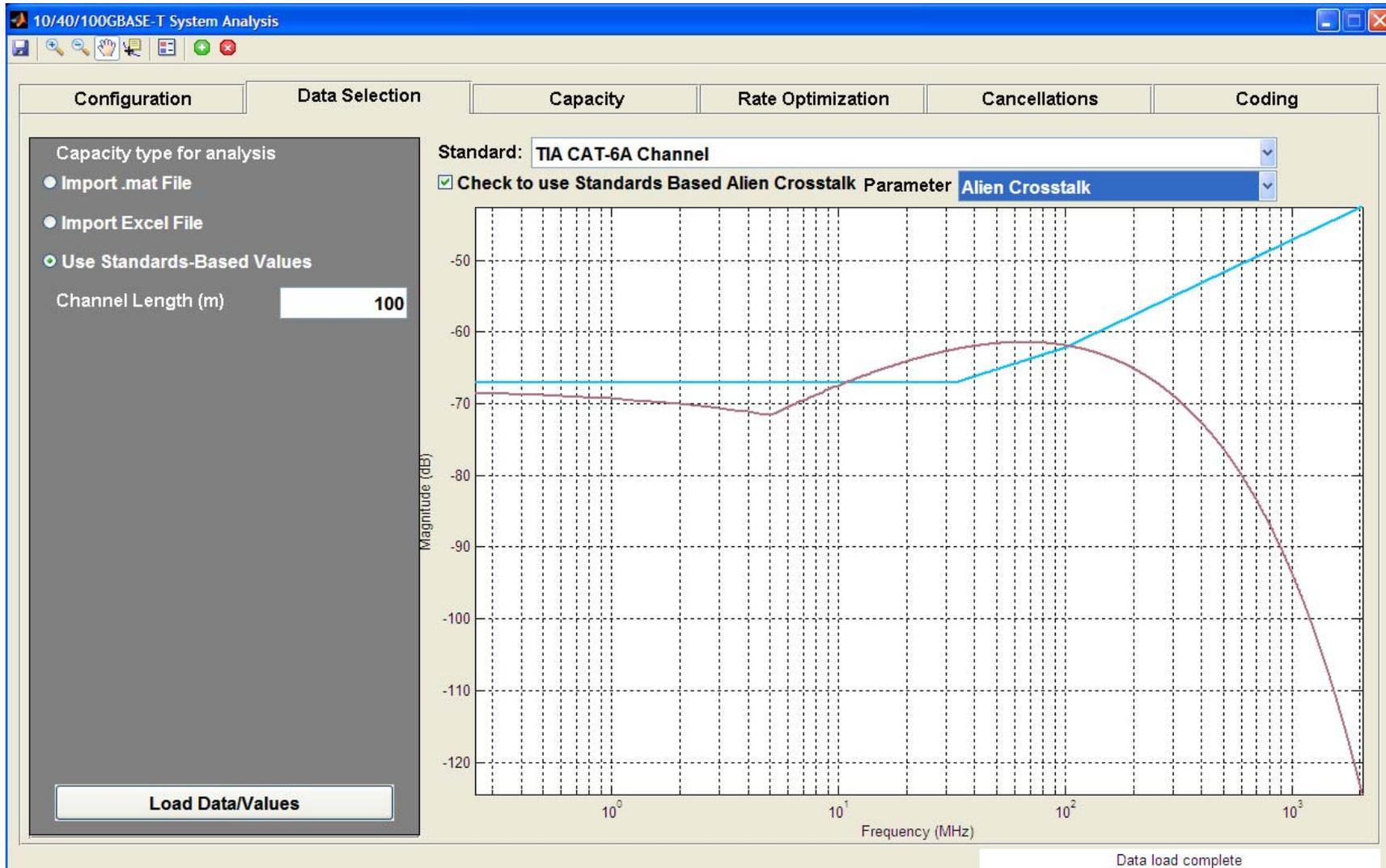
Channel Test Configurations

Channel Configuration	2 x Patch (m)	Horizontal (m)
		
Cat 6a U/UTP	2	26
Cat 6a F/UTP	3	39
Cat 7a S/FTP	5	90
		
Cat 7a S/FTP	1	50

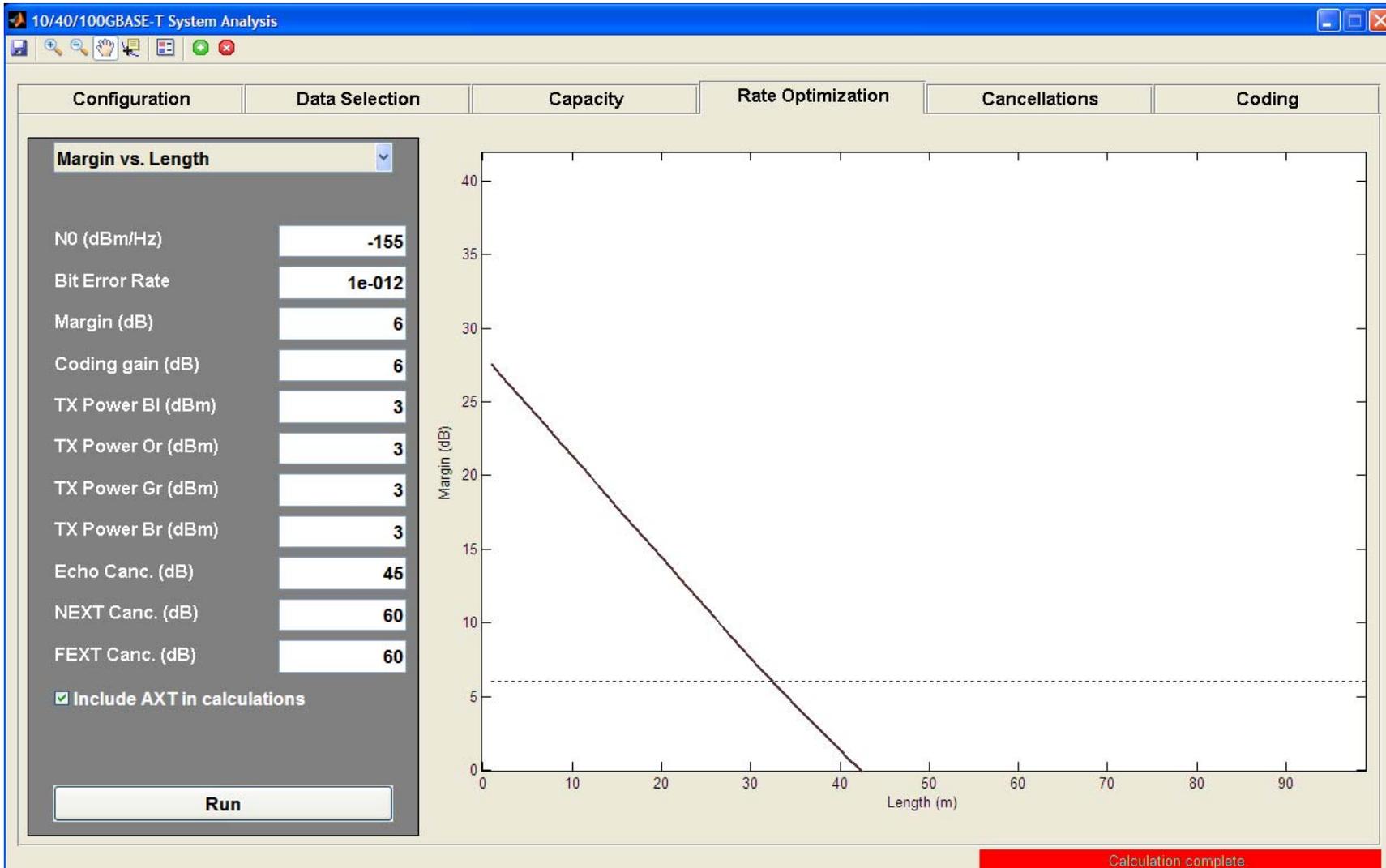
TIA Category 6a 100m Channel Model Internal Impairments



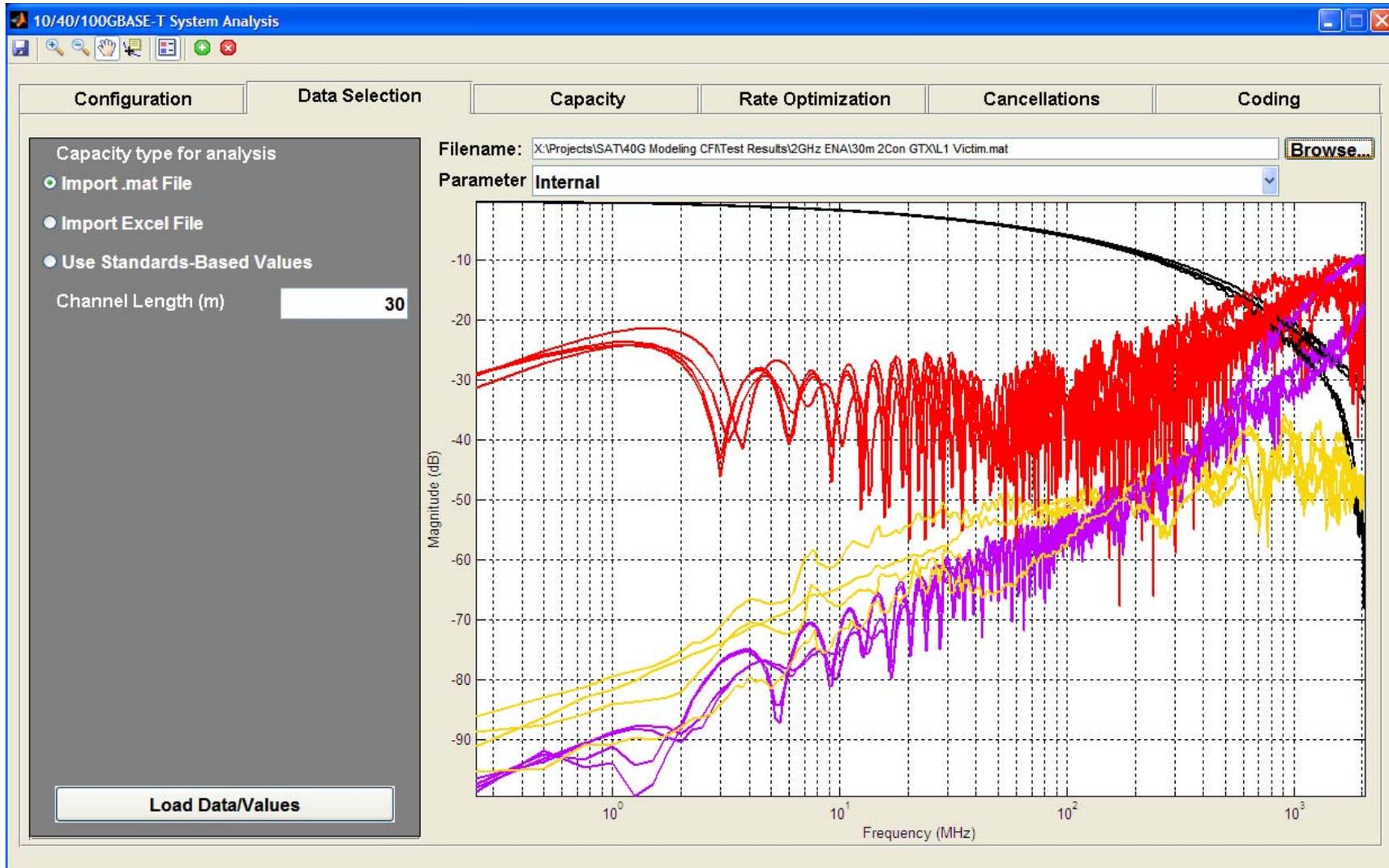
TIA Category 6a 100m Channel Model External Impairments



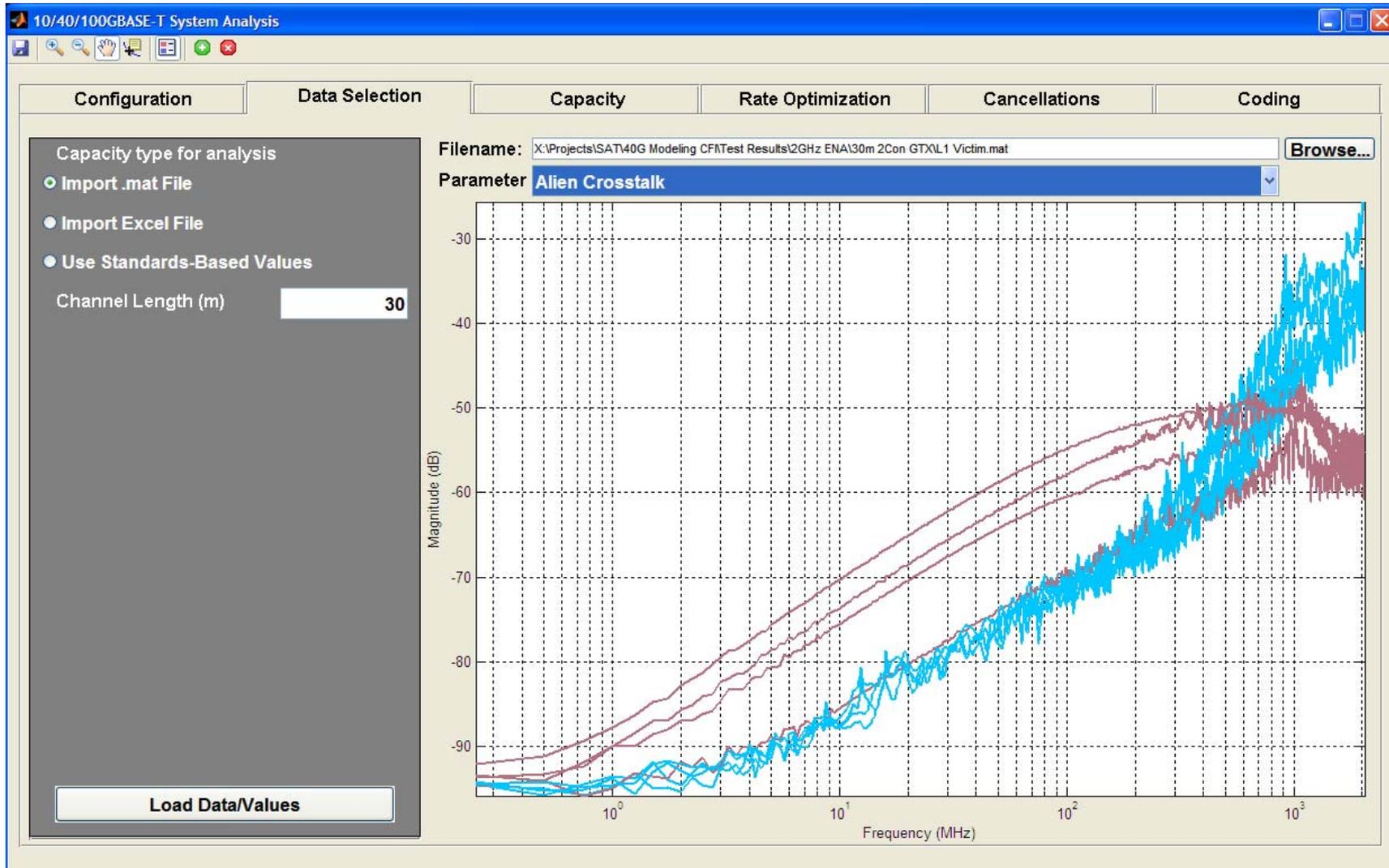
TIA Category 6a U/UTP Channel Predicted Reach



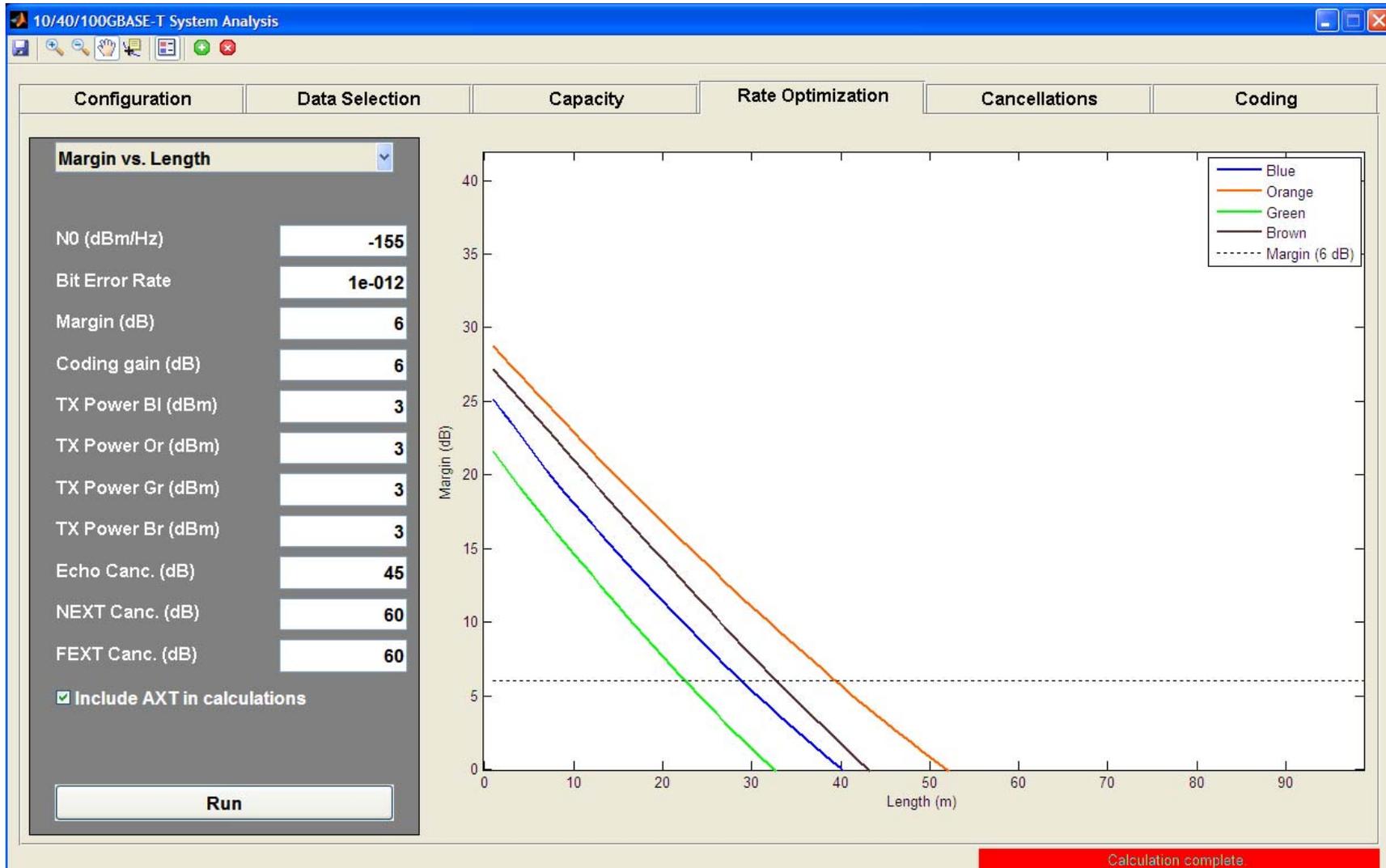
Category 6a Two Connector 30m Channel



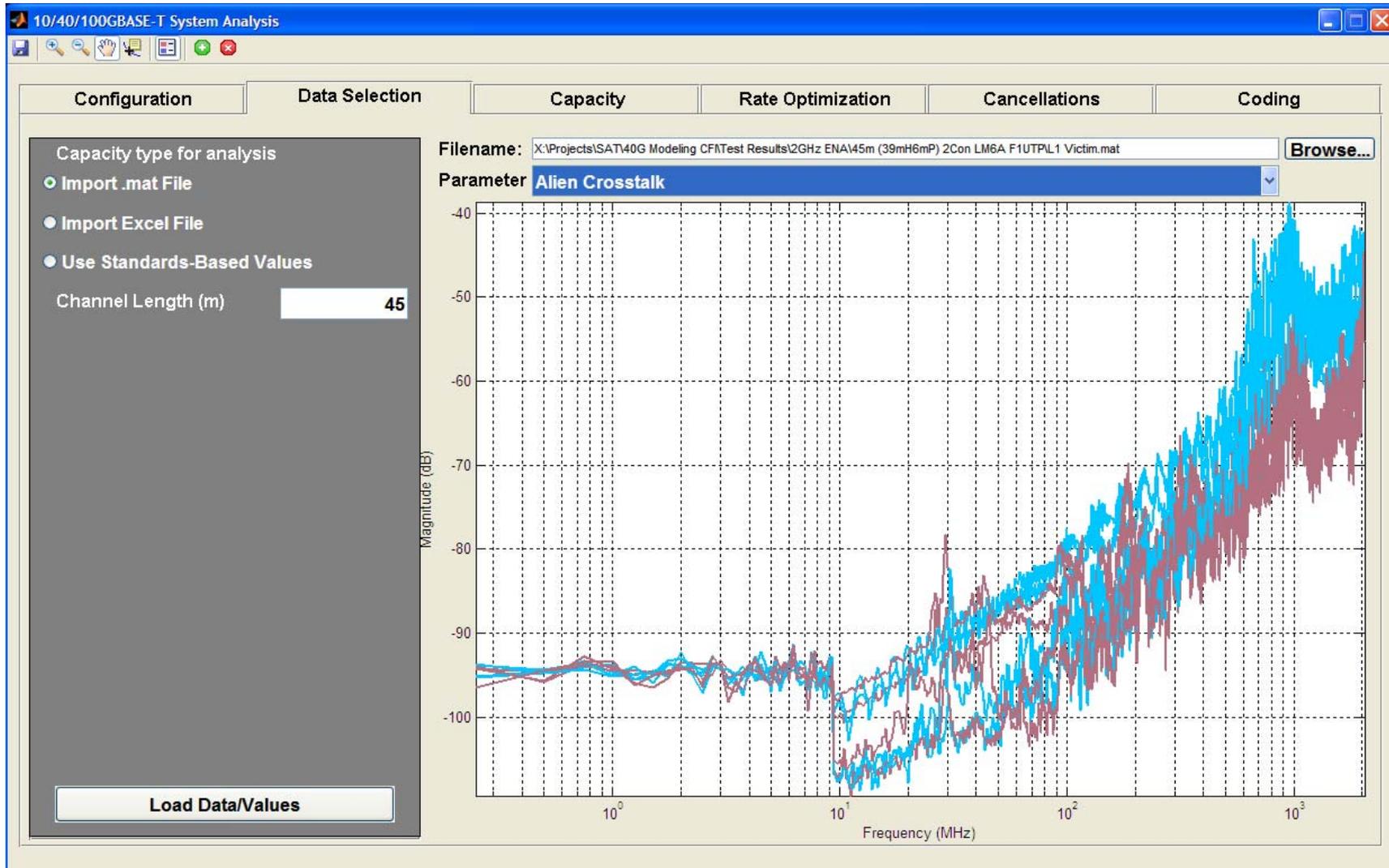
Category 6a Two Connector 30m Channel



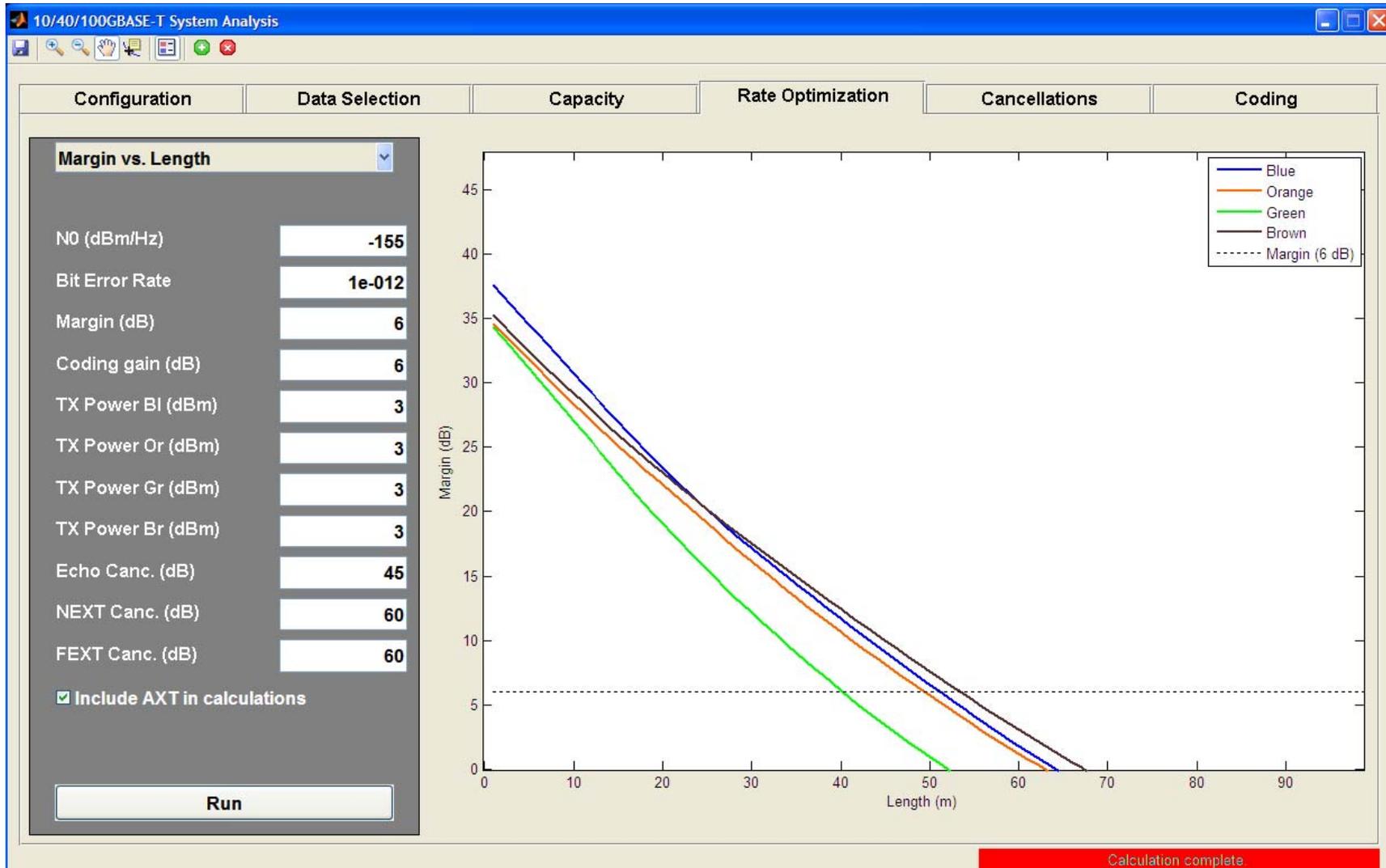
Category 6a U/UTP Two Connector 30m Channel



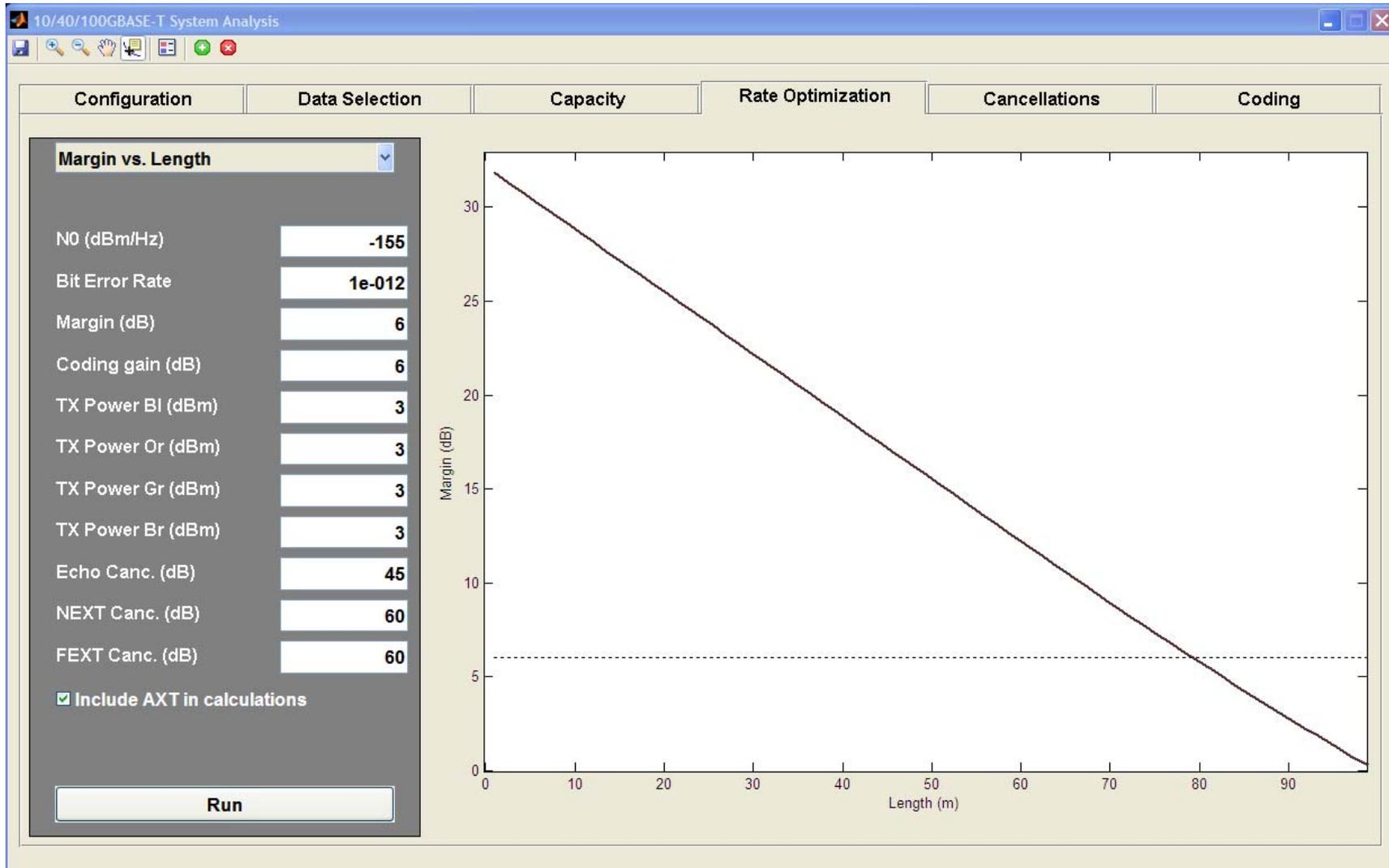
Category 6a F/UTP Two Connector 45m Channel



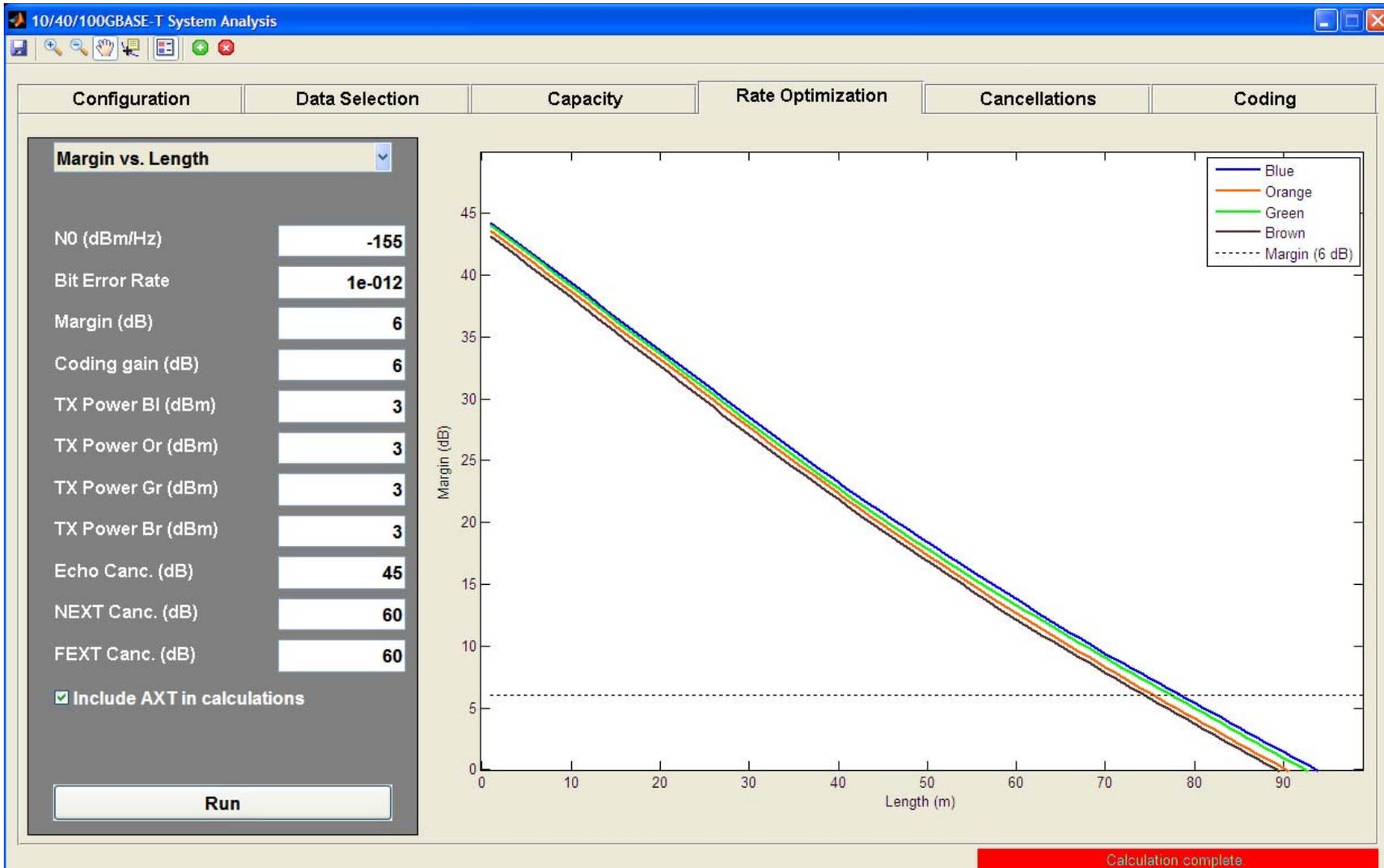
Category 6a F/UTP Two Connector 45m Channel



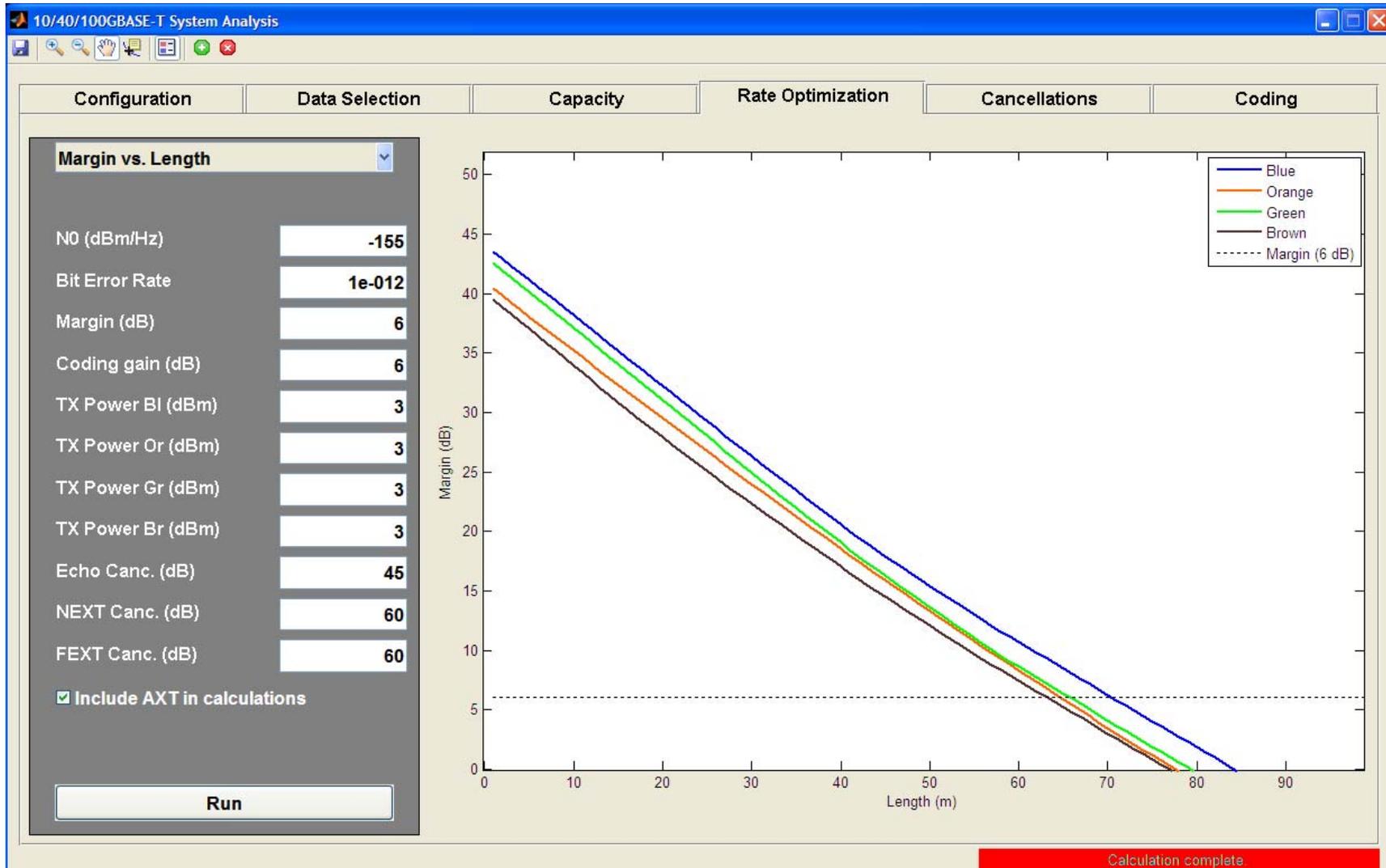
ISO Class FA Category 7a F/FTP Four Connector 100m Channel



Category 7a Two Connector 100m Channel



Category 7a F/FTP Four Connector 52m Channel



40G Capacity Reach (m) 6 dB Margin	As Specified (Extrapolated)	Observed
Cat 6a U/UTP	32.5	23.0
Cat 6a F/UTP	32.5*	40
Cat 7a F/FTP (2 Connector)	79	74
Cat 7a F/FTP (4 Connector)	79	63

* Alien Next Spec the same as U/UTP cabling

- Cat 6a split pair exhibits significant deviation above 500MHz
 - ◆ Insertion loss, Alien Crosstalk
- Cat 6a F/UTP increased reach due to improved Alien NEXT and IL
- Simple extrapolation of existing specifications may not represent performance of installed base

- Twisted Pair cabling exists which can support reach targets with additional bandwidth characterization
 - ◆ Cat6A U/UTP appears feasible for TOR distances
 - ◆ Cat6A F/UTP appears feasible for ~30-40m
 - ◆ Cat7A S/FTP appears feasible for ~60-70m
- **Future Work:**
 - ◆ Further study on impairments such as RL, IL, AXT and Common Mode Noise needed