

# Distributed LT Coding of Correlated Sources for a Single-Output MAC with Erasures

Bo-Yu Lin

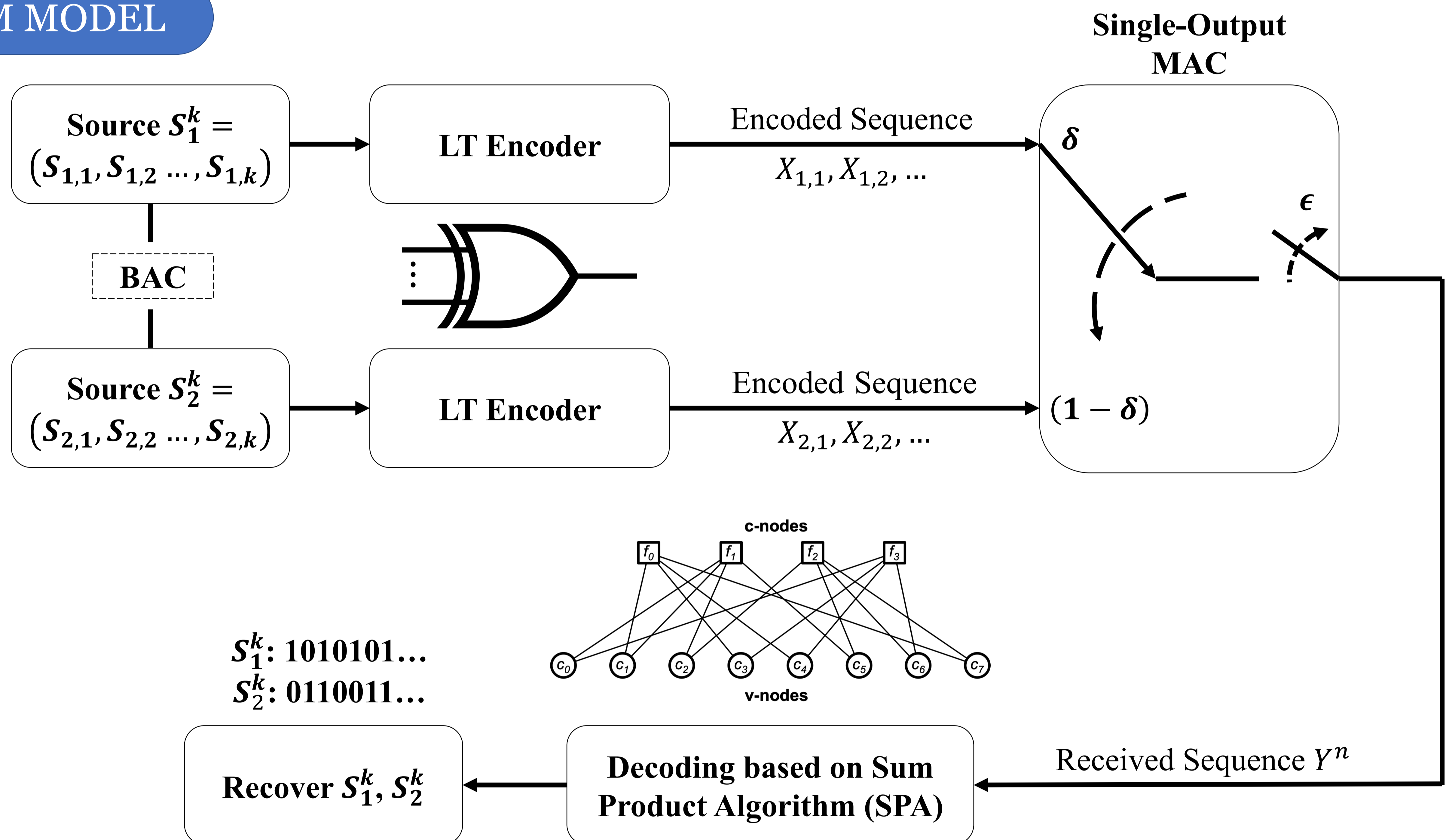
Department of Electrical Engineering  
National Taiwan University of Science and Technology  
Taipei, TAIWAN

Jen-Huan Huang and Jian-Jia Weng  
Department of Communications Engineering  
National Chung Cheng University  
Chiayi, TAIWAN

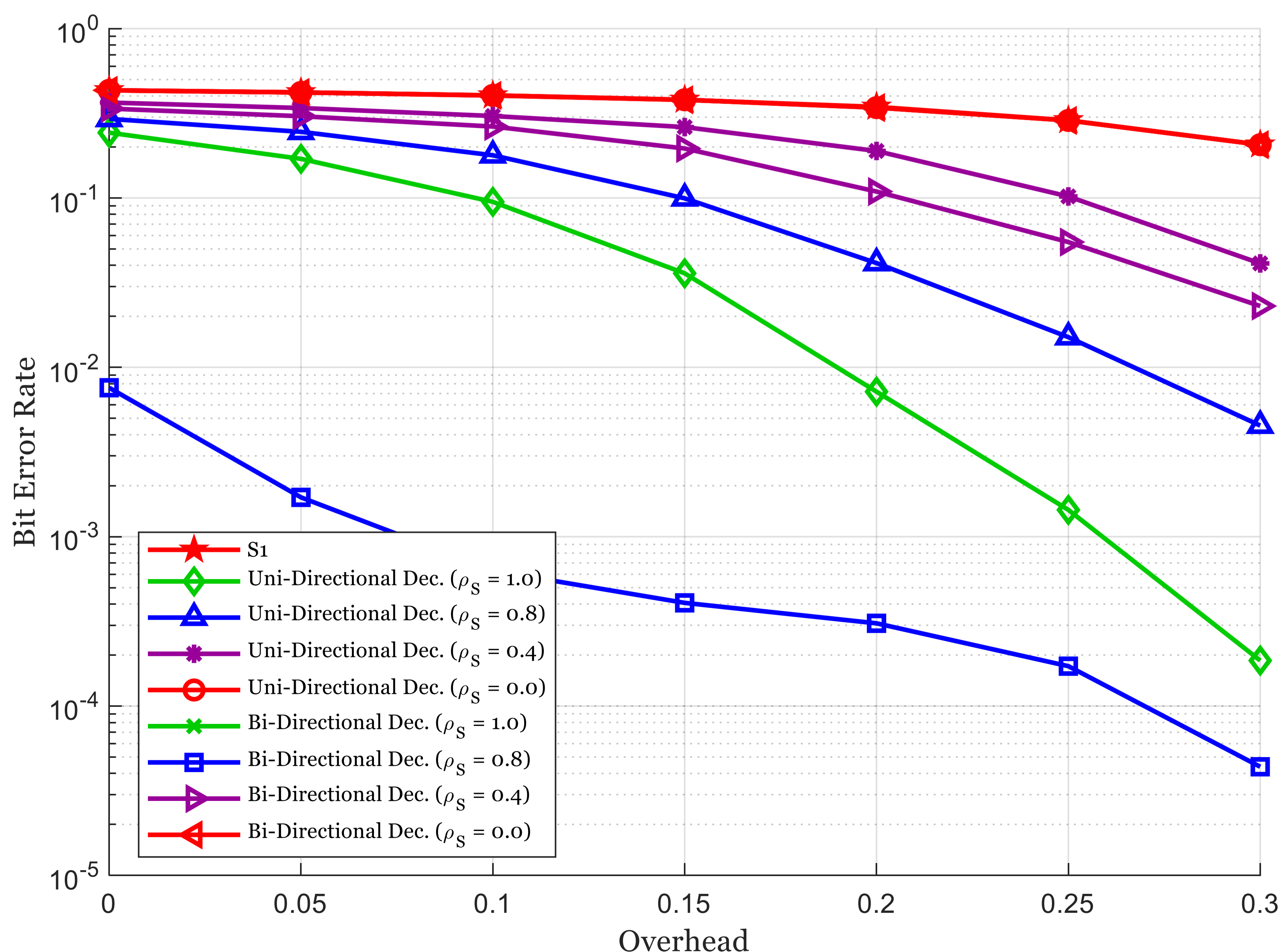
## ABSTRACT

This work considers a distributed encoding of binary correlated sources using Luby-transform (LT) codes, where the coded symbols are independently generated and transmitted over a single-output multiple-access channel (MAC) with erasures. Despite the independent encoding, a high source correlation reduces the reception overhead for the same error rate requirement. Here, three decoding strategies are used to demonstrate this correlation benefits. Moreover, the amount of received symbols from different encoders also impacts the data recovery performance.

## SYSTEM MODEL



## SIMULATION RESULTS AND CONCLUSIONS



### Simulation Settings:

- $K = 400$ , Robust soliton distribution with parameters  $c = 0.15$  and  $\delta = 0.2$
- The **separate decoding** decodes  $S_1^k$  and  $S_2^k$  using two LT decoders and without exchanging any information in between.
- The **uni-directional decoding** allows soft estimates of first decoder to be passed to the second LT decoder.
- The **bi-directional decoding** exchanges soft estimates of both decoders, thereby fully exploiting the available information at the receiver.

### Conclusions:

- Source correlation helps lower the bit-error-rate (BER).
- When  $S_1^k$  and  $S_2^k$  are uncorrelated (i.e.,  $\rho_S = 0$ ), any decoding strategy achieves the same BER.
- The recovery of the correlated sources cannot rely solely on their correlation. The number of received symbols from each encoder is equally important.

[Ref] M. Luby, "LT codes," in *Proc. 43rd Annu. IEEE Symp. Found. Comput. Sci.*, 2002, PP. 271–280