

**COGENT COMMUNICATIONS HOLDINGS, INC., AND SUBSIDIARIES**  
**NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)**

**8. Stock option and award plan: (Continued)**

The accounting for equity-based compensation expense requires the Company to make estimates and judgments that affect its financial statements. These estimates for stock options include the following.

**Expected Dividend Yield**—The Company uses an expected dividend yield based upon expected annual dividends and the Company's stock price.

**Expected Volatility**—The Company uses its historical volatility for a period commensurate with the expected term of the option.

**Risk-Free Interest Rate**—The Company uses the zero coupon US Treasury rate during the quarter having a term that most closely resembles the expected term of the option.

**Expected Term of the Option**—The Company estimates the expected life of the option term by analyzing historical stock option exercises.

**Forfeiture Rates**—The Company estimates its forfeiture rate based on historical data with further consideration given to the class of employees to whom the options or shares were granted.

The weighted-average per share grant date fair value of options was \$8.92 in 2019, \$8.45 in 2018 and \$7.06 in 2017. The following assumptions were used for determining the fair value of options granted in the three years ended December 31, 2019:

<b>Black-Scholes Assumptions</b>	<b>Years Ended December 31,</b>		
	<b>2019</b>	<b>2018</b>	<b>2017</b>
Dividend yield	4.5 %	4.6 %	4.1 %
Expected volatility	28.3 %	28.7 %	27.1 %
Risk-free interest rate	2.5 %	2.5 %	2.0 %
Expected life of the option term (in years)	4.3	4.4	4.5

Stock option activity under the Company's Award Plan during the year ended December 31, 2019, was as follows:

	<b>Number of Options</b>	<b>Weighted-Average Exercise Price</b>
Outstanding at December 31, 2018	168,547	\$ 41.01
Granted	68,552	\$ 55.44
Cancelled and expired	(37,416)	\$ 49.11
Exercised—intrinsic value \$0.8 million; cash received \$1.6 million	(43,017)	\$ 38.06
Outstanding at December 31, 2019—\$3.1 million intrinsic value and 7.5 years weighted-average remaining contractual term	156,666	\$ 46.21
Exercisable at December 31, 2019—\$2.2 million intrinsic value and 6.3 years weighted-average remaining contractual term	88,377	\$ 41.27
Expected to vest—\$2.9 million intrinsic value and 7.3 years weighted-average remaining contractual term	138,392	\$ 45.21