

Report Prepared On: 01/20/14

Structured Product Details

Name	Trigger Yield Optimization Notes linked to Aruba Networks, Inc.
Issue Size	\$4.00 million
Issue Price	\$17.44
Term	12 Months
Annualized Coupon	13.50%
Pricing Date	August 26, 2013
Issue Date	August 29, 2013
Valuation Date	August 26, 2014
Maturity Date	August 29, 2014
Issuer	Royal Bank of Canada
CDS Rate	104.51 bps
Swap Rate	0.67%
Reference Asset	Aruba Networks, Inc.'s stock
Initial Level	\$17.44
Trigger Price	\$13.95
Conversion Price	TBD
Dividend Rate	0.00%
Implied Volatility	46.38%
Delta¹	0.4
Fair Price at Issue	\$16.69
CUSIP	78009Q323
SEC Link	www.sec.gov/Archives/edgar/data/1000275/000121465913004948/s827130424b2.htm

Related Research

Research Papers:
www.slcg.com/research.php

- "Are Structured Products Suitable for Retail Investors?" December 2006.
- "Structured Products in the Aftermath of Lehman Brothers," November 2009.
- "What TiVo and JP Morgan Teach Us about Reverse Convertibles," June 2010.

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Trigger Yield Optimization Notes linked to Aruba Networks, Inc.

Description

Royal Bank of Canada issued \$4.00 million of Trigger Yield Optimization Notes linked to Aruba Networks, Inc. on August 29, 2013 at \$17.44 per note.

These notes are Royal Bank of Canada-branded single observation reverse convertibles. Single observation reverse convertibles pay periodic interest coupons and at maturity convert into shares of the reference security if the price of the reference security at the notes' maturity is below the trigger price determined when the notes were issued.

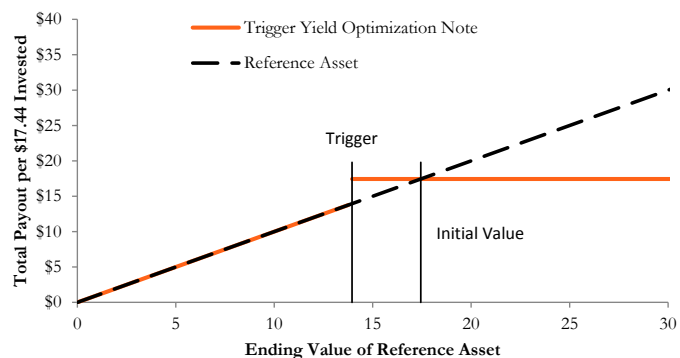
These 12-month notes pay monthly coupons at an annualized rate of 13.50%. In addition to the monthly coupons, on August 29, 2014 investors will receive the market value of one share of Aruba Networks, Inc.'s stock if on August 26, 2014 Aruba Networks, Inc.'s stock closes below \$13.95 (80% of Aruba Networks, Inc.'s stock price on August 26, 2013). Otherwise, investors will receive the \$17.44 face value per note.

Valuation

This Royal Bank of Canada single observation reverse convertible linked to Aruba Networks, Inc.'s stock can be valued as a combination of a note from Royal Bank of Canada and a short European out-of-the-money cash-or-nothing binary put option, and a short European out-of-the-money put option on Aruba Networks, Inc.'s stock. For reasonable valuation inputs this note was worth \$16.69 per \$17.44 when it was issued on August 29, 2013 because investors were effectively being paid only \$2.05 for giving Royal Bank of Canada options which were worth \$2.79.

There is no active secondary market for most structured products. Structured products, including this note, therefore are much less liquid than simple stocks, bonds, notes and mutual funds. Investors are likely to receive less than the structured product's estimated market value if they try to sell the structured product prior to maturity. Our valuations do not incorporate this relative lack of liquidity and therefore should be considered an upper bound on the value of the structured product.

Payoff Curve at Maturity

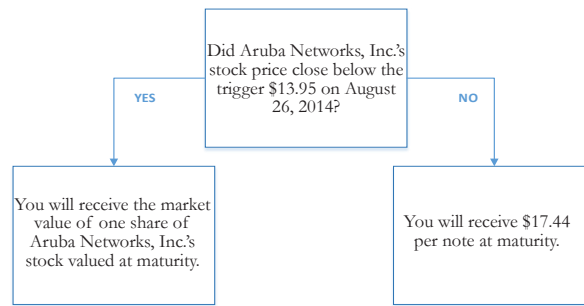


The payoff diagram shows the final payoff of this note given Aruba Networks, Inc.'s stock price (horizontal axis). For comparison, the dashed line shows the payoff if you invested in Aruba Networks, Inc.'s stock directly.

Principal Payback Table

Aruba Networks, Inc.'s Stock	Note Payoff
\$0.00	\$0.00
\$1.74	\$1.74
\$3.49	\$3.49
\$5.23	\$5.23
\$6.98	\$6.98
\$8.72	\$8.72
\$10.46	\$10.46
\$12.21	\$12.21
\$13.95	\$17.44
\$15.70	\$17.44
\$17.44	\$17.44
\$19.18	\$17.44
\$20.93	\$17.44
\$22.67	\$17.44
\$24.42	\$17.44
\$26.16	\$17.44

Maturity Payoff Diagram



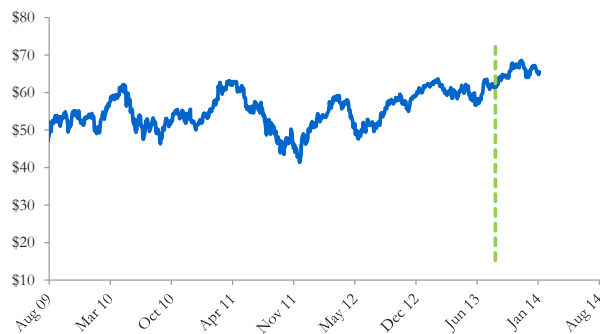
The contingent payoffs of this Trigger Yield Optimization Note.

Analysis

This single observation reverse convertible's 13.50% coupon rate is higher than the yield Royal Bank of Canada paid on its straight debt but, in addition to Royal Bank of Canada's credit risk, investors bear the risk that they will receive shares of Aruba Networks, Inc.'s stock when those shares are worth substantially less than the face value of the note at maturity.

Investors purchasing these reverse convertibles effectively sell put options to Royal Bank of Canada and post the note's issue price as collateral to secure satisfaction of the investors' obligations under the option contracts. Royal Bank of Canada pays investors a "coupon" that is part payment for the put options and part interest on the investors' posted collateral. This reverse convertible is fairly priced if and only if the difference between the reverse convertible's "coupon rate" and interest paid on Royal Bank of Canada's straight debt equals the value of the put option investors are giving to Royal Bank of Canada. Whether this reverse convertible is suitable or not is identically equivalent to whether selling put options on the reference stock at the option premium being paid by Royal Bank of Canada was suitable for the investor.

Royal Bank of Canada's Stock Price



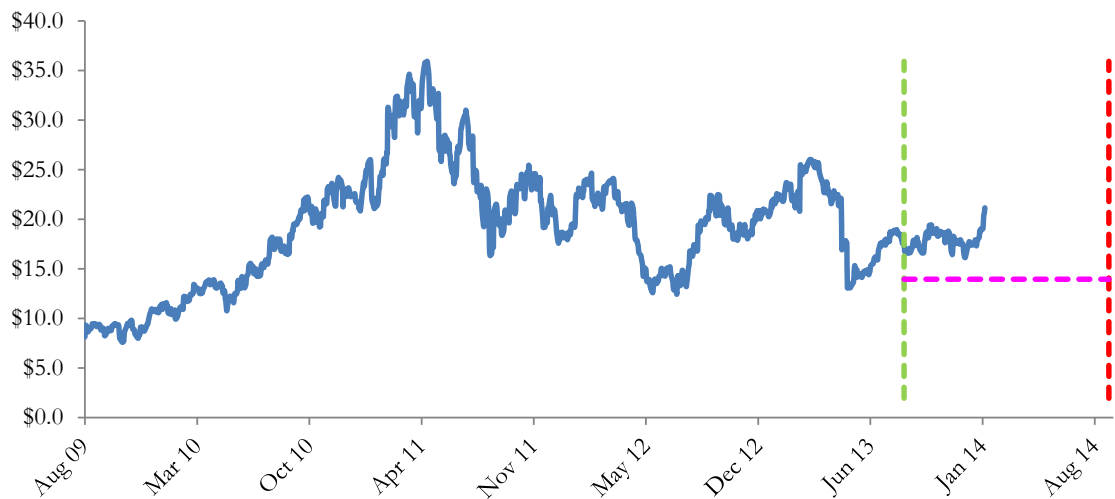
The graph above shows the adjusted closing price of the issuer Royal Bank of Canada for the past several years. The stock price of the issuer is an indication of the financial strength of Royal Bank of Canada. The adjusted price shown above incorporates any stock split, reverse stock split, etc.

Royal Bank of Canada's CDS Rate



Credit default swap (CDS) rates are the market price that investors require to bear credit risk of an issuer such as Royal Bank of Canada. CDS rates are usually given in basis points (bps). One basis point equals 0.01%. Higher CDS rates reflect higher perceived credit risk, higher required yields, and therefore lower market value of Royal Bank of Canada's debt, including outstanding Trigger Yield Optimization Note. Fluctuations in Royal Bank of Canada's CDS rate impact the market value of the notes in the secondary market.

Aruba Networks, Inc.'s Stock Price

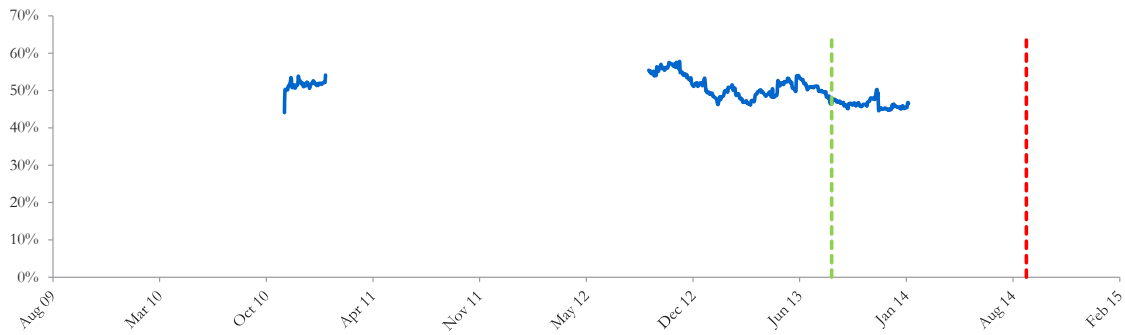


The graph above shows the historical levels of Aruba Networks, Inc.'s stock for the past several years. The final payoff of this note is determined by Aruba Networks, Inc.'s stock price at maturity. Higher fluctuations in Aruba Networks, Inc.'s stock price correspond to a greater uncertainty in the final payout of this Trigger Yield Optimization Note.

Realized Payoff

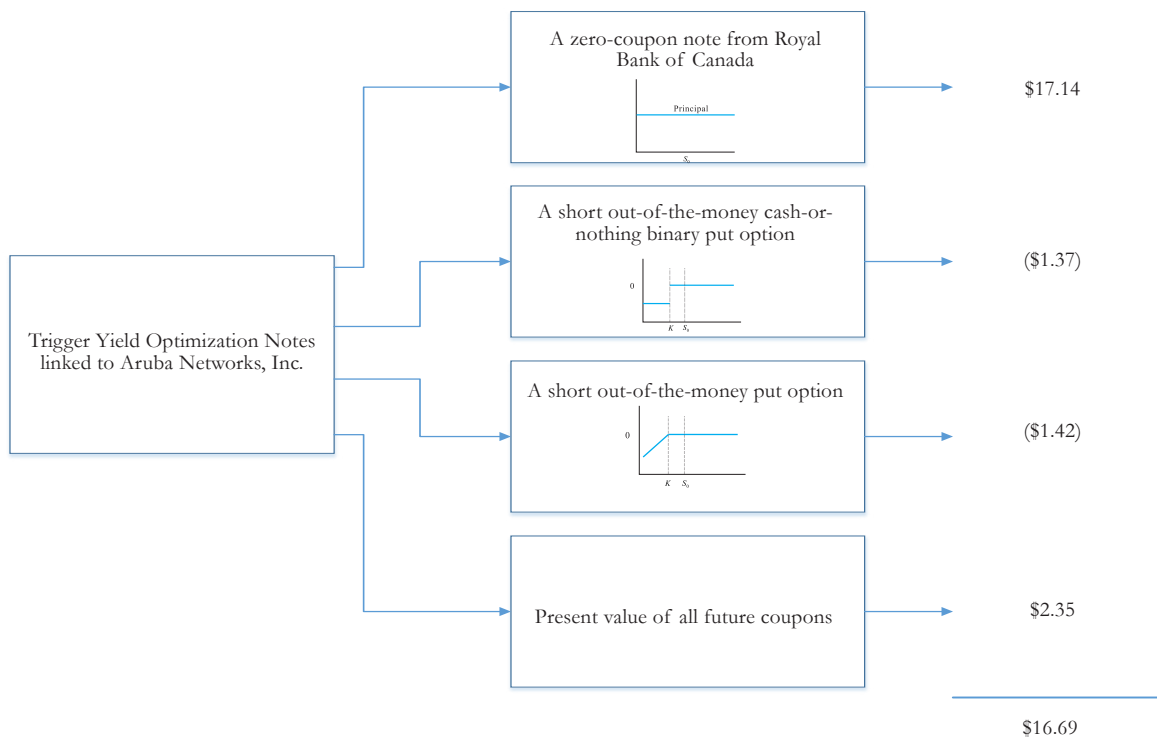
This product will mature on August 29, 2014.

Reference Asset Aruba Networks, Inc.'s Stock's Implied Volatility



The annualized implied volatility of Aruba Networks, Inc.'s stock on August 26, 2013 was 46.38%, meaning that options contracts on Aruba Networks, Inc.'s stock were trading at prices that reflect an expected annual volatility of 46.38%. The higher the implied volatility, the larger the expected fluctuations of Aruba Networks, Inc.'s stock price and of the Note's market value during the life of the Notes.

Decomposition of this Trigger Yield Optimization Note



This note can be decomposed into different components, and each component can be valued separately. The chart above shows the value of each component of this Trigger Yield Optimization Note.

1. Delta measures the sensitivity of the price of the note to the Aruba Networks, Inc.'s stock price on August 26, 2013.
2. CDS rates can be considered a measure of the probability that an issuer will default over a certain period of time and the likely loss given a default. The lower the CDS rate, the lower the default probability. CDS rate is given in basis points (1 basis point equals 0.01%), and is considered as a market premium, on top of the risk-free rate, that investors require to insure against a potential default.
3. Fair price evaluation is based on the Black-Scholes model of the Aruba Networks, Inc.'s stock on August 26, 2013.
4. Calculated payout at maturity is only an approximation, and may differ from actual payouts at maturity.
5. Our evaluation does not include any transaction fees, broker commissions, or liquidity discounts on the notes.