Positioned on a hillside a quarter-mile away, a Canon DIGISUPER100xs HD telephoto lens on an HD camera captures a live panoramic beauty shot of a major college stadium, complete with a cheering crowd surrounding the location studio hosts. But how does the broadcaster relay that dramatic HD video back to their TV truck?

**Challenge #1**

Sports Network Needs to Relay Telephoto HD Point-of-View Shot From Remote Vantage Point

Using Free Space Optics, the Canobeam DT-150 HD delivers live, uncompressed HD-SDI video from a maximum recommended transmission distance of approximately 1 kilometer (3,168 ft.). Canobeam DT-150 HD advantages include:

- Quick set-up/quick tear-down.
- No need to install quarter-mile HD fiber cable.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.

Using media converters, the broadcaster converted the HD-SDI signal from the HD camera to single-mode fiber-optic cable, which interfaced directly to a Canobeam DT-150 HD. The HD-SDI signal was received by a second Canobeam DT-150 HD, relayed via single-mode fiber and converted back to coaxial cable via a media converter, and then received by the HD broadcast truck.
**Transmission Distances at Varying Degrees of Atmospheric Attenuation**

<table>
<thead>
<tr>
<th>Weather Condition*1</th>
<th>Precipitation*2</th>
<th>Attenuation/km</th>
<th>Visibility*3</th>
<th>DT-150 Transmission Distance*3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin Fog</td>
<td>Heavy Rain @ 25mm/hr</td>
<td>10dB</td>
<td>1300m</td>
<td>1720m</td>
</tr>
<tr>
<td>Light Fog</td>
<td>Cloudburst @100 mm/hr</td>
<td>30dB</td>
<td>433m</td>
<td>780m</td>
</tr>
</tbody>
</table>

Visibility distances are approximate.

*(1) Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability.

*(2) This model is not compliant with SDI Check Field Signals (pathological signals).

---

**Specifications**

<table>
<thead>
<tr>
<th>Applications</th>
<th>HD-SDI/SD-SDI/DVB-ASI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Transmission Distance*1</td>
<td>20-1000m</td>
</tr>
<tr>
<td>Data Transmission Speed</td>
<td>1.485Gbps, 1.485/1.001Gbps, 270Mbps (*2)</td>
</tr>
<tr>
<td>Transmission Device</td>
<td>Laser Diode</td>
</tr>
<tr>
<td>Laser Wavelength</td>
<td>785±15nm</td>
</tr>
<tr>
<td>Laser Output Power</td>
<td>Approx. 11mW</td>
</tr>
<tr>
<td>Safety Class of Laser</td>
<td>Class 1M</td>
</tr>
<tr>
<td>Receiving Device</td>
<td>Si APD</td>
</tr>
<tr>
<td>Auto Tracking Adjustment</td>
<td>Horizontal: ±1.2° Vertical: ±1.2°</td>
</tr>
<tr>
<td>Media Interface</td>
<td>SFP SLOT x1</td>
</tr>
<tr>
<td>Console Port</td>
<td>RS-232C(DSUB-9Pin), 10Base-T(RJ-45)</td>
</tr>
<tr>
<td>Operation Temperature Range</td>
<td>-20°C~+50°C</td>
</tr>
<tr>
<td>Power</td>
<td>100-240VAC 50/60Hz (DC-48V optional)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Approx. 20W</td>
</tr>
<tr>
<td>Installation Environment</td>
<td>Indoor or outdoor (Weatherproof: IP56)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>246(W) x 168(H) x 487(D)mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 17.6 lbs (8Kg)</td>
</tr>
</tbody>
</table>

*(1) Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability.

*(2) This model is not compliant with SDI Check Field Signals (pathological signals).
Executives at the headquarters of a major cable network had no direct satellite or fiber connection with their production studios in a neighboring state. Neither location could send the other instant bidirectional HD video with embedded audio, which was essential to their operations.

**Cable Network HQ Requires Permanent Bidirectional HD Link to its Production Facility**

Fortunately, the cable network’s headquarters did have direct line of sight to a nearby building with access to either satellite connectivity or long-haul fiber. A permanent installation of a pair of Canobeam DT-150 HD’s—one on the roof of the building housing the cable network and a second unit on the roof of the building with satellite/fiber connectivity—established the reliable bidirectional HD-SDI video link (with embedded audio) that the network required.

**The Canobeam DT-150 HD**

Using media converters, the cable network converts its HD-SDI video to travel on single-mode fiber-optic cable, which interfaces directly to the Canobeam DT-150 HD permanently mounted on their roof. This HD-SDI signal is then received by the Canobeam DT-150 HD on the neighboring office building and relayed via single-mode fiber to a second media converter, which interfaces with a coaxial cable feeding the fiber connection. The result is a two-way bidirectional HD-SDI video link (with embedded audio).

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.
Transmission Distances at Varying Degrees of Atmospheric Attenuation

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>Precipitation</th>
<th>Attenuation/km</th>
<th>Visibility</th>
<th>DT-150 Transmission Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Haze</td>
<td>Light Rain @ 2.5mm/hr</td>
<td>3dB</td>
<td>4333m</td>
<td>3650m</td>
</tr>
<tr>
<td>Thin Fog</td>
<td>Heavy Rain @ 25mm/hr</td>
<td>10dB</td>
<td>1300m</td>
<td>1720m</td>
</tr>
<tr>
<td>Light Fog</td>
<td>Cloudburst @100 mm/hr</td>
<td>30dB</td>
<td>4333m</td>
<td>780m</td>
</tr>
</tbody>
</table>

Visibility distances are approximate. Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability.

Applications
- HD-SDI/SD-SDI/DVB-ASI

Standard Transmission Distance
- 20-1000m

Data Transmission Speed
- 1.485Gbps
- 1.485/1.001Gbps, 270Mbps

Transmission Device
- Laser Diode

Laser Wavelength
- 785±15nm

Laser Output Power
- Approx. 11mW

Safety Class of Laser
- Class 1M

Receiving Device
- Si APD

Auto Tracking Adjustment
- Horizontal: ±1.2° Vertical: ±1.2°

3R Function
- Yes

Media Interface
- SFP SLOT x1

Console Port
- RS-232C(DSUB-9Pin), 10Base-T(RJ-45)

Operation Temperature Range
- -20°C~+50°C

Power
- 100-240VAC 50/60Hz (DC-48V optional)

Power Consumption
- Approx. 20W

Installation Environment
- Indoor or outdoor (Weatherproof: IP56)

Dimensions
- 246(W) x 168(H) x 487(D)mm

Weight
- Approx. 17.6 lbs (8Kg)

(*)1 Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability.

(*)2 This model is not compliant with SDI Check Field Signals (pathological signals)
A spontaneous political demonstration in midtown Manhattan left no time for a news crew to make a costly long-haul fiber connection back to Washington DC or to establish an HD microwave relay to the roof of a nearby TV station with satellite connectivity. How, then, could the crew get live video of this important news event back to the Washington DC TV station?

**SOLUTION**

**The Canobeam DT-150 HD**

Inexpensive enough for news operations, the Canobeam DT-150 HD sets up quickly to establish a temporary line-of-sight HD connection. The news crew used a Canobeam DT-150 HD to link their ENG van to a second Canobeam on the roof of a nearby TV station with satellite connectivity. This provided the crew with a quick and easy way to relay live HD video of the demonstration back to Washington DC.

- **Maximum recommended transmission distance:** approximately 1 kilometer (3,168 ft.).
- **Exclusive Canon Auto Tracking** maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.
- **No frequency interference, coordination, or licensing necessary with Free Space Optics**

By using Telecast Fiber Systems’ SHED (SMPTE Hybrid Elimination Device) or similar technology on either end of the connection, a pair of Canobeam DT-150 HD units provided bidirectional HD-SDI video with embedded audio to a nearby New York TV station, which then transmitted the video via a simple satellite link to a second TV station in Washington DC.
Transmission Distances at Varying Degrees of Atmospheric Attenuation

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>Precipitation</th>
<th>Attenuation/km</th>
<th>Visibility</th>
<th>DT-150 Transmission Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Haze</td>
<td>Light Rain @ 2.5mm/hr</td>
<td>3dB</td>
<td>4333m</td>
<td>3650m</td>
</tr>
<tr>
<td>Light Fog</td>
<td>Cloudburst @100 mm/hr</td>
<td>30dB</td>
<td>4333m</td>
<td>780m</td>
</tr>
</tbody>
</table>

Visibility distances are approximate. Above values are calculated by transmission margin, beam divergence, Gaussian intensity distribution of light. Actual transmission distance should be considered with scintillation, backlight noise, and other factors.

3. All distances expressed in meters.

(*) Above values are different from Canon recommended transmission distances described in specifications.

Specifications:

- Applications: HD-SDI/SD-SDI/DVB-ASI
- Standard Transmission Distance (*1): 20-1000m
- Data Transmission Speed: 1.485Gbps / 1.485/1.001Gbps, 270Mbps (*2)
- Transmission Device: Laser Diode
- Laser Wavelength: 785±15nm
- Laser Output Power: Approx. 11mW
- Safety Class of Laser: Class 1M
- Receiving Device: Si APD
- Auto Tracking Adjustment: Horizontal: ±1.2°, Vertical: ±1.2°
- 3R Function: Yes
- Media Interface: SFP SLOT x1
- Console Port: RS-232C (DSUB-9Pin), 10Base-T (RJ-45)
- Operation Temperature Range: -20°C ~ +50°C
- Power: 100-240VAC 50/60Hz (DC-48V optional)
- Power Consumption: Approx. 20W
- Installation Environment: Indoor or outdoor (Weatherproof: IP56)
- Dimensions: 246(W) x 168(H) x 487(D)mm
- Weight: Approx. 17.6 lbs (8Kg)

(*) Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability

(‡) This model is not compliant with SDI Check Field Signals (pathological signals)
Atop a building in the heart of the city, HD cameras outfitted with a Canon portable HD zoom lens and a Canon DIGISUPER 100xs HD telephoto lens provide live coverage of celebrities entering a major entertainment venue. Meanwhile, 1,500 ft. away, a mobile HDTV control room is set up to switch the event. HD-SDI video with embedded audio, bidirectional camera control, return video, tallys, and IFB are a must, but it’s too far to run a heavy SMPTE hybrid fiber cable or single-mode fiber cable along city streets.

**CHALLENGE # 4**

**Major Live Entertainment Event Needs**
**Bi-Directional HD Alternative to 1500 ft. Fiber Cable**

A Canobeam DT-150 HD positioned next to the rooftop HD cameras used line-of-sight Free Space Optics to establish a secure bidirectional HD-SDI connection with a second Canobeam DT-150 HD mounted above the production truck parked 1,500 ft. away. The two Canobeam DT-150 HD units and additional hardware (see box at right) provided HD-SDI video with embedded audio, bidirectional camera control, return video, tallys, and IFB to and from the HDTV truck.

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.

By using Telecast Fiber Systems’ SHED (SMPTE Hybrid Elimination Device) or similar technology on either end of the connection, a pair of Canobeam DT-150 HD units can provide not only bidirectional HD-SDI video with embedded audio, but also bidirectional camera control signals, return video, tallys, and IFB.
Transmission Distances at Varying Degrees of Atmospheric Attenuation

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>Precipitation</th>
<th>Attenuation/km</th>
<th>Visibility</th>
<th>DT-150 Transmission Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Haze</td>
<td>Light Rain @ 2.5mm/hr</td>
<td>3dB</td>
<td>4333m</td>
<td>3650m</td>
</tr>
<tr>
<td>Thin Fog</td>
<td>Heavy Rain @ 25mm/hr</td>
<td>10dB</td>
<td>1300m</td>
<td>1720m</td>
</tr>
<tr>
<td>Light Fog</td>
<td>Cloudburst @ 100 mm/hr</td>
<td>30dB</td>
<td>433m</td>
<td>780m</td>
</tr>
</tbody>
</table>

Visibility distances are approximate. Above values are calculated by transmission margin, beam divergence, Gaussian intensity distribution of light. Actual transmission distance should be considered with scintillation, backglight noise, and other factors.

3. All distances expressed in meters.

Specifications

- **Applications**: HD-SDI/SD-SDI/DVB-ASI
- **Standard Transmission Distance** (*1): 20-1000m
- **Data Transmission Speed**: 1.485Gbps, 1.485/1.001Gbps, 270Mbps (*2)
- **Transmission Device**: Laser Diode
- **Laser Wavelength**: 785±15nm
- **Laser Output Power**: Approx. 11mW
- **Safety Class of Laser**: Class 1M
- **Receiving Device**: Si APD
- **Auto Tracking Adjustment**: Horizontal: ±1.2° Vertical: ±1.2°
- **3R Function**: Yes
- **Media Interface**: SFP SLOT x1
- **Console Port**: RS-232C(DSUB-9Pin), 10Base-T(RJ-45)
- **Operation Temperature Range**: -20°C~+50°C
- **Power**: 100-240VAC 50/60Hz (DC-48V optional)
- **Power Consumption**: Approx. 20W
- **Installation Environment**: Indoor or outdoor (Weatherproof: IP56)
- **Dimensions**: 246(W) x 168(H) x 487(D)mm
- **Weight**: Approx. 17.6 lbs (8Kg)

(*)1 Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability.

(*)2 This model is not compliant with SDI Check Field Signals (pathological signals).
Major Broadcast Network Needs to Transmit Control Signals to Robotic PTZ Camera Mounted on the Side of a Skyscraper

A robotic PTZ (pan/tilt/zoom) camera is mounted 20 floors up on the side of a landmark office building to capture panoramic shots of a world-famous ice-skating rink. It’s the perfect vantage point, but how can the TV network transmit control signals to the PTZ camera while simultaneously receiving the camera’s HD-SDI video output?

The Canobeam DT-150 HD

Rather than running bulky and expensive SMPTE hybrid fiber cable or single-mode fiber cable up to the 20th floor, a far better solution is the convenience and reliability of Canon’s Canobeam DT-150 HD bidirectional wireless Free Space Optics technology. The Canobeam DT-150 HD enables the TV network to capture bird’s-eye point-of-view shots of a world-famous tourist destination in HDTV while simultaneously controlling the pan, tilt, and zoom functions of their sky-high robotic camera (which is outfitted with a Canon HD telephoto lens).

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from street traffic or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.

Using technology such as Evertz’s Quad Serial Data Embedders and De-Embedders and a pair of Canobeam DT-150 HD video transceivers, the network is able to transmit HD-SDI video signals from the PTZ camera to their control room while simultaneously transmitting the required control signals back to the robotic PTZ head and its camera.
### Challenge-Solution Equipment List:
- Robotic P/T/Z Camera with HD-SDI Video and Serial Data Control
- Robotic P/T/Z Controller (Serial Data)
- Canon Canobeam DT-150 HD Link / One Pair
- Evertz Quad Serial Data Embedder / Two
- Evertz Quad Serial Data De-embedder / Two
- Electrical/Optical (E/O) Converter / Two
- Optical/Electrical (O/E) Converter / Two
- HD-SDI Video Monitor / Two
- Appropriate length of Coax Cable / Three
- Appropriate length of Single Mode Fiber / Two
- Appropriate length of Serial Digital Cables / As Needed

### Specifications

#### Transmission Distances at Varying Degrees of Atmospheric Attenuation

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>Precipitation</th>
<th>Attenuation/km</th>
<th>Visibility</th>
<th>DT-150 Transmission Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Fog</td>
<td>Light Rain @ 2.5mm/hr</td>
<td>3dB</td>
<td>4333m</td>
<td>3650m</td>
</tr>
<tr>
<td>Thin Fog</td>
<td>Heavy Rain @ 25mm/hr</td>
<td>10dB</td>
<td>1300m</td>
<td>1720m</td>
</tr>
<tr>
<td>Light Fog</td>
<td>Cloudburst @100 mm/hr</td>
<td>30dB</td>
<td>433m</td>
<td>780m</td>
</tr>
</tbody>
</table>

#### Applications
- HD-SDI/SD-SDI/DVB-ASI

#### Standard Transmission Distance (*1)
- 20-1000m

#### Data Transmission Speed
- 1.485Gbps
- 1.485/1.001Gbps, 270Mbps (*2)

#### Transmission Device
- Laser Diode

#### Laser Wavelength
- 785±15nm

#### Laser Output Power
- Approx. 11mW

#### Safety Class of Laser
- Class 1M

#### Receiving Device
- Si APD

#### Auto Tracking Adjustment
- Horizontal: ±1.2° Vertical: ±1.2°

#### 3R Function
- Yes

#### Media Interface
- SFP SLOT x1

#### Console Port
- RS-232C(DSUB-9Pin), 10Base-T(RJ-45)

#### Operation Temperature Range
- -20°C~+50°C

#### Power
- 100-240VAC 50/60Hz (DC-48V optional)

#### Power Consumption
- Approx. 20W

#### Installation Environment
- Indoor or outdoor (Weatherproof: IP56)

#### Dimensions
- 246(W) x 168(H) x 487(D)mm

#### Weight
- Approx. 17.6 lbs (8Kg)

---

Visibility distances are approximate. Above values are calculated by transmission margin, beam divergence, Gaussian intensity distribution of light. Actual transmission distance should be considered with scintillation, backlight noise, and other factors.

3. All distances expressed in meters.

(*) Above values are different from Canon recommended transmission distances described in specifications.

---

www.canobroadcast.com
email: BCTV@cusa.canon.com
1-800-321-4388 (Canada: 905-795-2902)